The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLVIII
No. 1252

SATURDAY, JUNE 26, 1943
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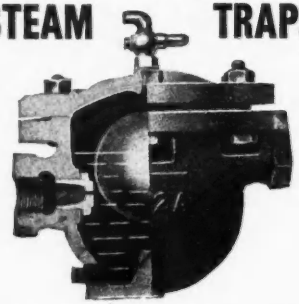

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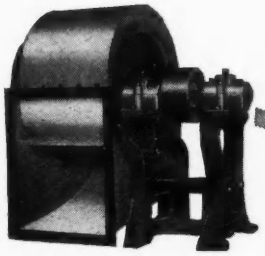

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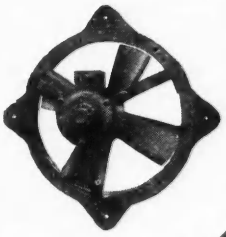

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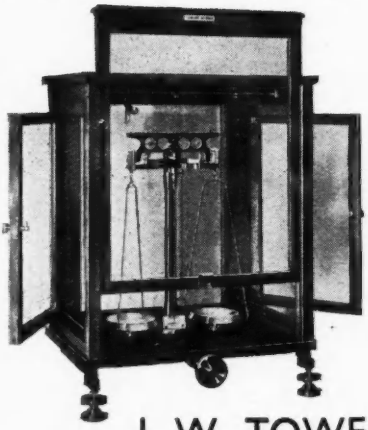

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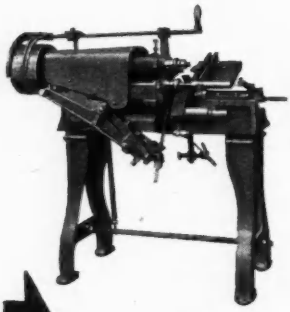

1

Though listed as a trimmer and beader, this machine is also in constant use on the varied operations performed on cylindrical drawn shells — Knurling, Curling, Sunk Curling, Screwing, Interrupted Thread Rolling, Popping and Indenting.

2

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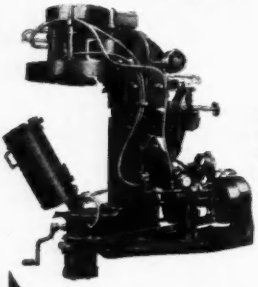

3

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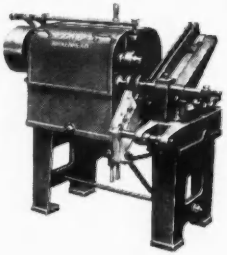

4

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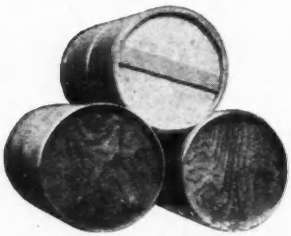

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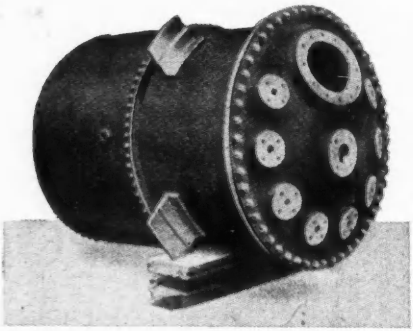

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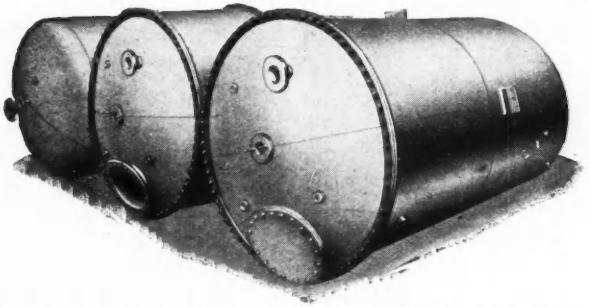

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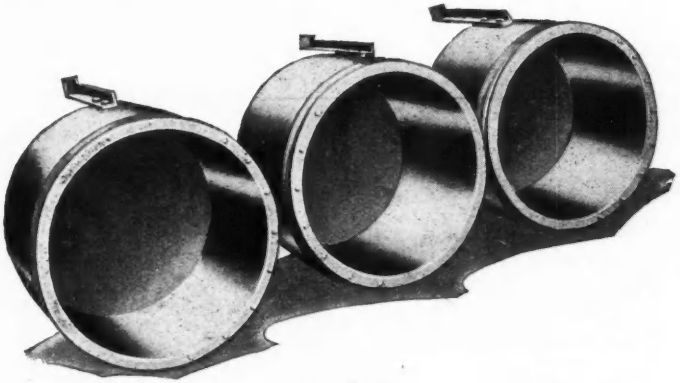

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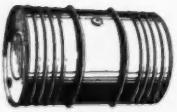

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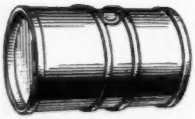

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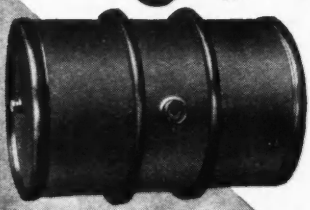

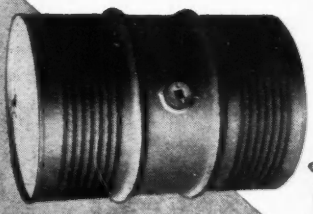

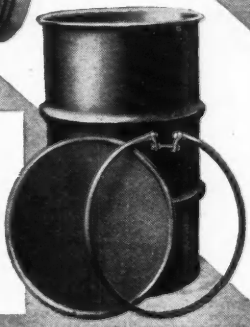

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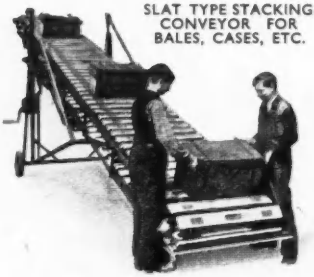

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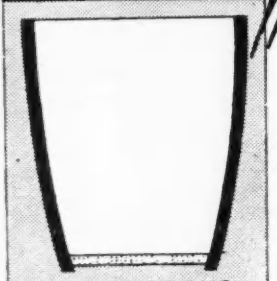

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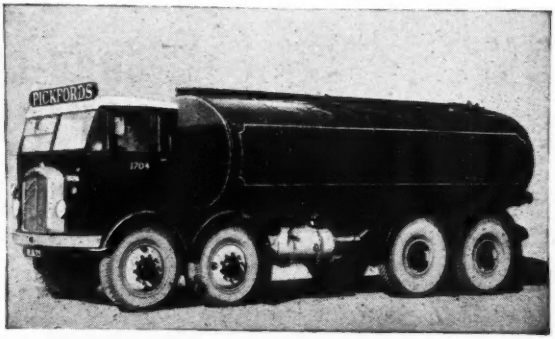

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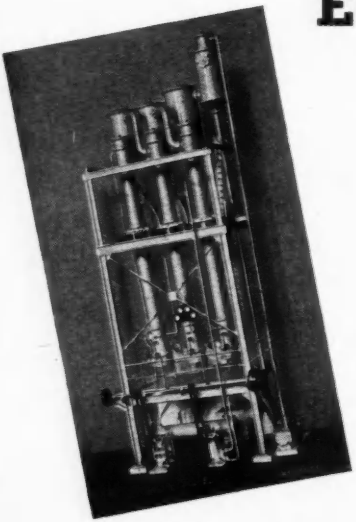

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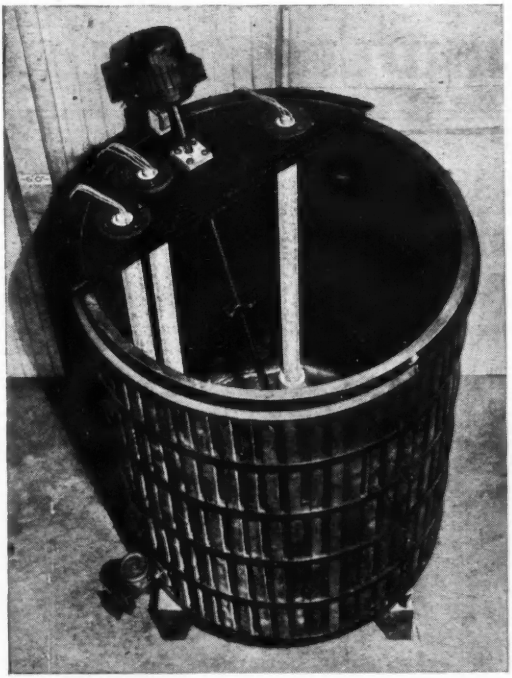

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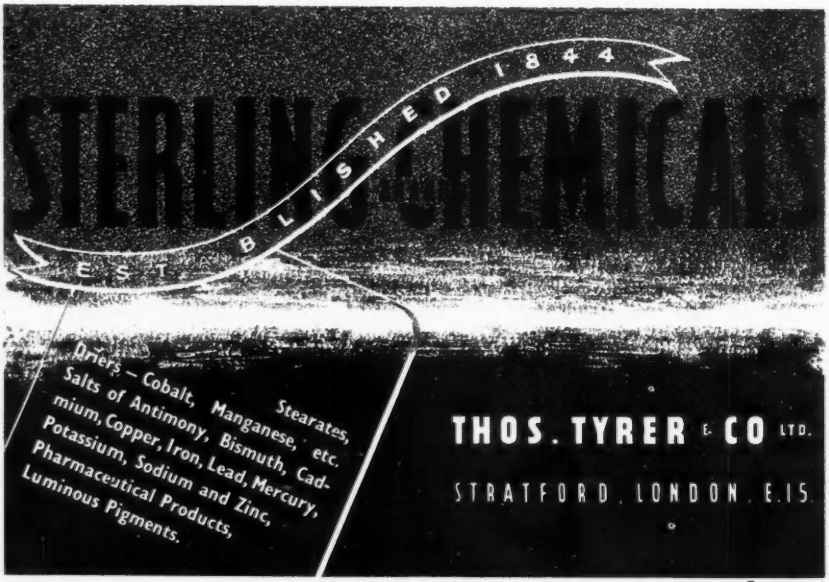
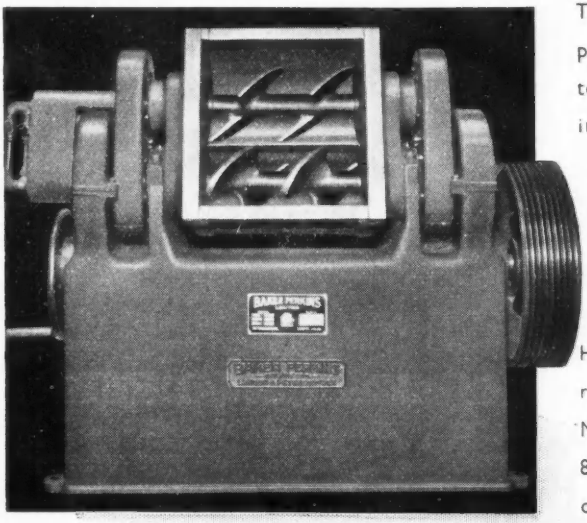


Greenwood

Universal Mixers



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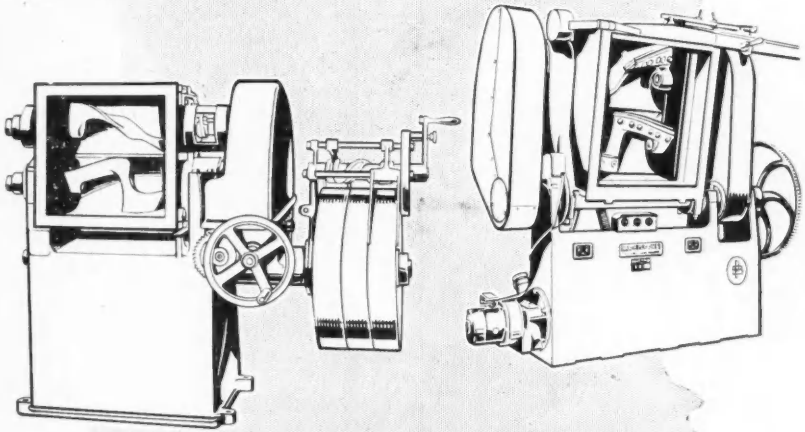

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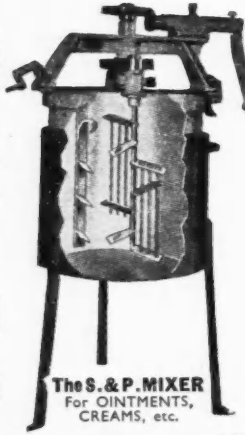

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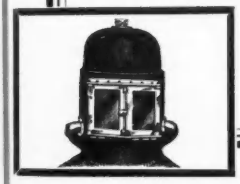

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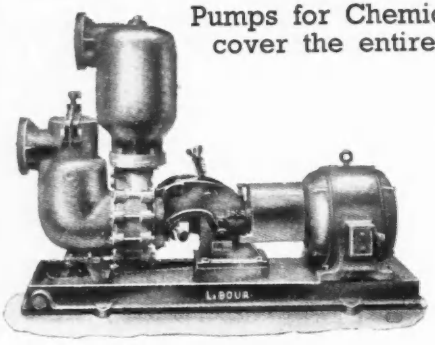

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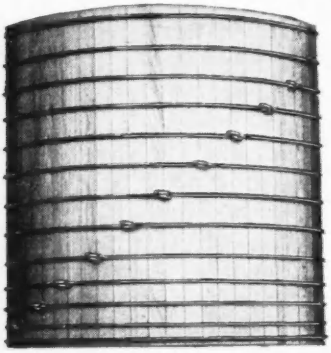

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War-Time Transport of Chemicals

AN aspect of the treatment and handling of chemical containers which cannot be awarded too much consideration in these times is the question of their transport from place to place. We have had it dinned into our ears often enough that the transport problem is one of the major difficulties of carrying on a war; and it is just and right that this fact should be impressed on us almost *ad nauseam*. For we had come, in the piping times of peace, to regard the transport question as scarcely a problem at all, so smoothly did the wheels of transport run, oiled by the lubricant of scientific progress and good commercial organisation.

The organisation and the progress are still there, of course, but the task that they have to face is of a very different nature and of enormous magnitude. Transport is called upon to deal with situations never before contemplated and under previously unheard - of - conditions. Who, for example, in their peace-time senses, would have contemplated carting huge quantities of that valuable chemical, water, across miles of the Sahara Desert? Nevertheless, it has had to be done, under the grim behest of the war-god, just as many other unexpected demands have had to be met. An instance at the opposite end of the scale is the expedition of relatively vast amounts of blood and plasma, *in appropriate containers,* to the four corners of the earth where our troops are fighting and in danger of losing their own natural blood supply. And so it goes on.

Meanwhile, what of the vessels in which water and the other chemical products have to make their way about the world? In the first place, containers have to do many more "tours of duty" than would be their normal lot. Materials of the most commonplace type—steel, tinplate, wood—have all to be conserved with a greater or less degree of care, according to the momentary scarcity of supply. One-way containers have become returnable; normally returnable containers have to do journey after journey, necessitating special care in their maintenance. Much of the material that has to be transported constitutes a considerable hazard both in transit and on discharge if it is not handled with care and knowledge. And, to add to all the problems, the

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additional burden is imposed upon the users of containers, and on the consumers of the materials contained therein, that the vessels pass through the hands of persons ignorant not only of the prescribed way to handle them with care, but also of the possible dangers of dealing with the conveyed commodities.

Technical staffs (such as have not been called away to more "vital" duties) have a specially anxious time. A continual watch must be kept on all tank cars in use, whether they are on rail or road; loading and unloading workers must be cautioned, when need demands, of the risks involved in handling containers improperly. Thanks to the ever-ready adaptability of the British race, the main lessons are quickly picked up, and accidents are far less frequent than the ominous tone of the preceding sentences might have led a layman to believe. Nevertheless, continual watchfulness remains the duty of the "old hands."

The chemical manufacturers of this country have always enjoyed a high reputation for the condition in which their products have been delivered. In peace time, this is simply good business; in war, it may make the difference between the winning and the losing of a battle. It is hard to keep up standards with a depleted and diluted staff, yet these standards are being kept up wonderfully well. We should venture to guess that the proportion of "duds" due to faulty conditions of transport is singularly low. Our chemical engineers and metallurgists have an unequalled knowledge of the problems of corrosion involved in the transit of acids and the like, and can prescribe the requisite material for lining the tank cars or other vessels used in the process. All makers of chemical transport vessels have applied this knowledge to the construction of appropriate vehicles for every chemical purpose, special engineering skill, for example, having been applied to the design of vehicles for the transport of "delicate" liquids such as distilled water and rose-hip syrup. Insulation against extreme conditions of temperature is an important matter, and it must always be remembered that some products are subject to loss by evaporation, others to damage by freezing, yet others to expansion due to heat. In the days when every item of equipment for the Eighth Army had to cross the Equator twice, it needs no great effort of imagination to realise how important was the proper solution of such problems.

Not unnaturally, with so many and so varied commitments on hand, the idea of using new materials for the transport of chemicals has not been dismissed as unworthy of development. On the contrary, materials hitherto comparatively little used are well to the fore. A great stimulus to the utilisation of fibre and paper containers has been provided by the study of cellulose chemistry, for example. "Paper" is far from being the flimsy material of ordinary terminology when it is a question of utilising it for the long-distance transport of powers and granular products, for example. Multiwall paper bags offer exceptional strength against rough handling in passage, and the adoption of automatic bagfilling machinery has greatly extended their use. Fibre drums have one supreme claim to consideration—their lightness, as compared to metal, in the transport of powdered products. They will stand a lot of knocking about, are impervious to moist air, and are easily handled.

Wood, glass, and plastic materials all have their uses for the transport of chemicals in war time, and play a vital part in keeping the war industries of this country going at full tilt. But it is still probable that metal containers outnumber all others in the routine day-to-day duty of transferring chemicals from one place to another. Huge and invaluable though they may be, the metal resources of the United Nations demand careful economy none the less, and it is obligatory on all of us to see that metal which has been fabricated into containers does not find its way too soon to the salvage dump. Particular attention, perhaps, should be paid to the careful handling and proper maintenance of "permanent" containers, such as tank cars, and it is here that knowledge of the best methods of filling and discharging such vessels applies. We all know of "the natural perversity of inanimate objects," and of the need for haste in these urgent days; but we do not feel that we are going beyond our brief in insisting that it is the duty of all who handle chemical containers to treat them with as much respect as they would a high explosive shell—though for different reasons!

NOTES AND COMMENTS

The Importance of Containers

OBSOLESCENCE is a weakness that affects all chemical plant; an it seems affects all chemical plant; and it seems just to demand some compensation for it. The obsolescence of chemical containers, however, is a rather different matter. There is no doubt about it; containers simply *do* wear out sooner or later; and it is the bounden duty of all sections of the chemical industry to-day to see that "later" and not "sooner" becomes the operative word. We have heard of occasions when a supply of chemicals, vitally needed in some essential war operation, were not forthcoming because the supplier was in need of new containers for their transport, his previous stock having become exhausted. The following pages go some little way towards indicating to what extent the manufacturers of containers are using their efforts to keep the supply going. It is up to the users to see that the supply lasts as long as possible. Both actual care in handling and continued administrative checking and inspection are of the highest importance to-day. Drums, kegs, and so on, in their journeys to and fro, pass through the hands of many who are only remotely interested in the chemical industry. All the more reason, when these receptacles are being actually handled by the industry, that they should be treated with respect. True enough, the business of checking the numbers of drums is a dreary affair; but the industrial war, quite as much as the military war, cannot be won without fatigues. Every one who is handling containers, whether in actuality or on paper, is on an essential job, and it is his duty to see that the job is carried out with all due care.

A Dream Factory

BY a coincidence, the leading article in our last week's issue, dealing with multiple-effect evaporation, appeared in print almost simultaneously with the Fuel Efficiency Bulletin No. 18 (Part I), which details the advantages of the sensible use of latent heat as a method of economising fuel. Incidentally, every chemical engineer should secure a copy of this bulletin, and if he is wise he will then apply for Part II, which will not be distributed broadcast, but only on request. In the present bulletin the Ministry of Fuel has made use of a special technique, well known but always effective, for "putting across" information. Many years ago we remember reading a military pamphlet called *The Defence of Duffer's Drift,* which, in a series of dreams, showed three methods, bad, indifferent, and good, of defending an isolated outpost. Bulletin 18 uses this method to illustrate the reorganisation of a mythical Red Tape Factory, in which the red colour for the tape is extracted from the red blots on used Government blotting-paper. It is worth noting that "the exhausted pulp is sent to a government blotting paper factory where it is converted into pink blotting paper of such low quality that the Stationery Office cannot use it, but sell it to Private Enterprise for interleaving desk diaries." The red ink is leached out of the pulp and forms a thin liquor technically known as "pinkie"; this goes to the evaporators and is concentrated to a ruddy tint and is now called "bloodie." By the ingenuity of the works assistant engineer, Mr. L. A. Tent, the hourly consumption of steam in the factory is reduced from 20,000 to 6300 lb., the money spent on coal and water falls from £7100 to £2300 per annum, and the senior administrative officer, Mr. P. Crastinate, gets a knighthood.

Cascade Heating

THE diagrams illustrating the various stages in the improved use of the available steam are far from being funny. They show schematically—perhaps ideally—the best ways in which the latent heat of the steam can be employed, very much in the manner indicated in our last week's leader, by utilising cheap second-hand plant and willing ingenuity. Particularly interesting is the piece of mechanism called the "centipede" into which vapour mixed with varying quantities of air is fed so that it meets the water to be heated in successive stages—the coolest vapour meeting the water first, of course. It cannot be too strongly emphasised that the order of input of the vapours to the centipede is of the greatest importance; if it were reversed none of the heat from the drying machine (at 115° F.) could be used because the water would already have been heated up to 190° F. by the vapour from the extractor vats. The

system illustrated is an excellent example of cascade or stage heating. In the final diagram, where the system is brought to perfection, it is seen that this ideal Red Tape Factory uses all its latent heat twice, and nearly half of it three times. Let Private Enterprise see that it does not lag too far behind!

The Future of Wood

RESEARCH officials of Canadian Industries, Ltd., have made a report on the enormous post-war possibilities of wood resulting from the processes which have been developed as a result of war-time conditions. Chemical science is capable of endowing wood with qualities that vastly improve upon nature. Retaining its inherent advantages for construction—workability, economy, low heat conductivity and ease of replacement—the industrial chemist can supply the post-war building industry with timber treated in such a way as to be a distinctive structural material in its own right. In the chemical transformation of wood, crystal urea shows great promise. Green woods impregnated with urea and dried become relatively plastic when heated. They may be bent, twisted, and compressed. They retain their new shapes, resuming their normal rigidity and hardness when cool. Timber to-day is also treated to make it highly fire-resistant. Wood can be made so distasteful to termites that these pests will leave it strictly alone. Wood is also "preserved" by a chemical that resists rot, providing an estimated length of life three to ten times that of untreated material. These qualities are imparted to timber in a pressure chamber, where chromated zinc chloride is forced deep into the wood structure. Already there are several wood-preserving plants in Canada performing this service for war-time construction. For years, chromated zinc chloride has been most widely used in treating sleepers, bridge planking, mine timbers, and textile mill roofs. The huge building programme set in motion by the war—with the need for speed superimposed on the shortage of structural steel—gave preserved wood a chance to prove itself beyond certain specialised uses. Millions of feet of treated timber are now in service. Plastics formulated from cellulose and from other sources will be used widely by the building and furnishing industries. All manner of applications are predictable, from luminous light switches to crystal clear plastic decorative pieces.

Hydrogen Fluoride Catalyst

THE newest and most advantageous of the successful catalysts for alkylation and isomerisation, according to recent American reports, appears to be anhydrous hydrofluoric acid, which, moreover, is relatively non-corrosive to most metals, though it constitutes a mild industrial hazard necessitating simple precautionary measures. All the hydrogen fluoride is practically recovered for re-use from the spent acid. Use of this catalyst is further recommended for the simplicity of the reaction conditions and the low temperature and pressure employed. Yields of over 90 per cent. of the theoretical are obtained with only a few tenths of one per cent. catalyst loss, when alkylating isoparaffins with olefines. Benzene may be alkylated with propene at 0° C., yielding 84 per cent. Alkylation, a single-step process, has proved to have a decided advantage over polymerisation of olefines and hydrogenation of the polymer to the same isoparaffins in two steps. Isomerisation has recently been applied as an alternative to a unique neohexane synthesis, in which, by heat and pressure alone, ethylene is combined with isobutane concentrated from natural gas. The new catalytic synthesis process is the "blanket" isomerisation of low-octane refinery naphthas, resulting in an octane-number improvement of 40 to 50. Thus isomerisation of low-grade refinery naphthas or natural-gasoline residues may well offer an economic outlet for these low-grade hydrocarbons. The twin reaction of alkylation and isomerisation solves the problem of decreasing the excessive volatility of butanes and propane and of improving the octane number of the less volatile residues after the higher octane number fractions have been removed.

Sixth "magnesium from brine" plant of the Dow Magnesium Corporation has started production at Marysville, Mich., electrolysing magnesium chloride supplied by a companion plant at Ludington, which is situated on the shores of Lake Michigan, near by. The two installations together cost $40,000,000. An interesting and novel feature is the use of 2,000,000 lb. of silver in the electrical bus bars, normally made of copper.

War-Time Care of Containers

Experience Remedies Shortage

by "TRANSPORT MANAGER"

SO long as chemical products continue to be made and used in industry, with need for transport from maker to user, there will continue the recurring question of what container—as to type and material—is most suitable for handling the product according to the means and duration of transport. But under war conditions there are certain points which need particular attention, and which may well determine a change in present practice or perhaps still more strict adherence to what has hitherto been followed.

In the first place the additional demand for certain chemical products for war-time uses has resulted in a scarcity of certain types of containers; likewise, the need for using certain constructional materials in other fields has put the manufacture of containers of certain other types quite out of the question, or at least has made a diminution in their manufacture. Added to this, manufacturing facilities have been reduced—in some instances unwisely—by over enthusiasm in directing the resources of manufacturing plant to other work. Then, on the user's side, war-time economy coupled with increased demand, and the necessity for avoiding wastage of product, production time, or transport, has made it more necessary than ever before to give the best possible protection against loss and damage in the course of moving products from maker to user. The sum total of all these considerations, which could be stated in much more detail, is that users of containers, due to war-time conditions, must make all possible "economy" in use by keeping the containers in good condition, so that their serviceable life is long, and returning empty containers as quickly as possible so that no shortage occurs at the chemical manufacturers' works; economy does not mean that the cheapest container or substitutes for what has hitherto been used will suffice, or that new departures from standards hitherto adopted can be encouraged without first giving thought to the consequences of the somewhat changed conditions.

Necessary Refinements

Apart from being a package pure and simple, providing for convenience in handling powder, loose solids or liquids, a container must have certain other essential features. In the case of the metal drum or can for liquid products, there must be refinements of manufacture to prevent leakage, and to enable the drum or can to stand up better against rough handling; the metal used must not only have no deleterious action on the product, and vice versa, but also it must not corrode externally under bad weather conditions, or at least corrosion must be kept down to the minimum. In many cases external corrosion of drums and cans more than anything else probably shortens their serviceable life and weakens the seams, so causing premature leakage, while the rest of the container is still in good condition. Seams weakened by external corrosion greatly reduce the serviceable strength, and sooner or later rough handling in transport, as also an unforeseen dropping or falling while unloading, will become evident in sudden failure at one of the seams or perhaps at the bung or neck.

Co-operation with Makers

The manufacture of metal cans and drums is highly specialised work, particularly when they are needed to be liquid-tight, and for this reason alone it is well to co-operate with the makers as to what can or cannot be supplied to meet a particular need as regards strength, speed and ease of handling, and price. Whether or not containers are "returnable," or so-called "non-returnable," is a matter which tends to be rather set aside in war-time, for even the non-returnable drum which was much in use pre-war (with its cost passed on to the buyer of the product) has now proved itself capable of making far more than one journey and, with certain constructional refinements and care in unsealing and re-sealing, it offers a much wider scope for returnable use than had hitherto been thought.

The painting of the outside surface of metal drums keeps them free from external corrosion, but rough usage in transport can affect the length of time the paint gives adequate protection, and, therefore, it is well to inspect drums periodically to see if repainting—of part or the whole—is necessary. Care in loosening and in tightening screw bungs and caps, using tools of the proper shape and size for the job, will increase the serviceable life by preventing damage to screw threads and failure at the adjacent joints, which can arise from undue strain in turning the bung or cap. Moreover, see that drums and cans are not needlessly left lying about in exposed positions irrespective of whether they are full or empty. Good protection from adverse conditions of weather is most essential if metal drums and cans are to remain in use as long as present conditions makes desirable; the external coat of paint, or the galvanising, or the tinplate, plays its own share in giving protection, but it still needs your co-operation in handling and in storage.

Still another point particularly concerned with use in war-time may be mentioned; containers should be easy to empty, and in emptying there should be drainage of the contents to the last drop. Care in replacing the bung or cap immediately after emptying will prevent the entry of dirt or moisture, and so allow the container to be refilled immediately with the same product on reaching the manufacturer's works without need for cleaning, but when this practice is adopted there must be an understanding between both parties that the user will give attention to this matter and vouch for his reliability in so doing for the convenience of the supplier.

Fibre and Paper

In the packaging of powders and loose solids, there is particular need to keep the product dry, and here a little more thought might be given to the use of fibre containers which offer impermeability to water vapour. It is true that there are now war-time demands for paper and such materials in other fields, as witness the unflagging salvage campaigns, but what may be considered wise economy (from the official point of view) in one direction may indeed prove very false economy in another, for fibre drums and fibre boxes do offer remarkably good protection for a product against damage by moisture, and by reason of their remarkable strength they also provide good resistance against mechanical injury in transport.

As to their moisture-resisting qualities a few points may be mentioned, because deterioration of chemical products by climatic conditions can be serious. In the first place it is well to know that no plain fibre drum or fibre box offers 100 per cent. protection against the entry of moisture. With waxed paper, from 0.1 to 120 grams of water may pass through one square metre of the material in 24 hours when the differential pressure is one millimeter of mercury, the amount varying according to the precise quality of the "waxing"; for ordinary paper the figures are 70-250; vegetable parchment, 25-70; cellulose acetate, 0.1-150; cellulose nitrate, 1.4-15; these figures were determined at the National Bureau of Standards in the United States. In fibre containers, brittleness develops if the material is too dry, and loss of strength occurs when it gets too wet. During shipment the external surface may get wet by condensation from warm moist air. Water, in the form of a shower of rain, does not cause as much damage by penetration (as distinct from water coming through an unprotected joint) as does the water vapour in a continuously moist atmosphere, but, nevertheless, the continued presence of a film of rain water will have practically the same result as exposure to atmosphere of 100 per cent. relative humidity.

Many users of metal drums are now substituting liquid-tight wooden barrels, which if well made and properly handled can give good service. When this change is adopted it must be recognised that the wooden barrel must be treated with more care than the metal drum. The same rough treatment that causes a dent in a metal drum may leave but little evidence of damage on a wooden barrel, but invisible damage can easily be done and becomes suspected only when leakage results. Barrels intended to be used for petroleum products, for instance, are usually made liquid-tight by an inner coat of glue, which is applied hot with due care so that the whole of the interior surface is covered and allowed to set. If this coating of glue is broken leakage becomes inevitable, for little there is then to prevent petroleum products from reaching the surface of the wood. The glue is sufficiently resilient, however, to allow for the injury caused by the ordinary shocks of transport, but rough treatment must be avoided—even the drop of a few inches upon a hard surface—as it invariably results in damage and subsequent leakage.

Care of Barrels

Wooden barrels should be unloaded by aid of a "skid," not lifted and allowed to drop the last few inches; even when a skid is used care must be taken to ensure that the barrel is eased down the skid and not permitted to slide under its own weight. Wooden barrels can be moved from place to place by rolling them on the bilge, provided that the distance is only a few yards, that no big obstacles have to be surmounted and that no descent involving a sharp drop is involved. But to extend the serviceable life of the barrel, it is advisable to use a skid, or a conveyor or a truck, for distances which are more than a few yards. The damage which can be done to wooden barrels by rolling them over rough cobblestones, or over rail tracks, is much greater than would be imagined; the same thing is true of one barrel bumping into another as they are rolled and come to rest. The loading or unloading of wooden barrels at ports should be done by aid of chime hooks, or a sling; loading nets cause damage by distortion under the superimposed weight, which is different in its effects from the superimposed weight when barrels are properly stacked on their bilges. Even when stacked it is usual to employ 2 in. by 4 in. timbers, which rest on the outside edge of the bilge hoops at both ends of the barrel; stacking in any other manner, especially if more than four barrels high, will produce distortion. It must also be borne in mind that when wooden barrels are stacked in exposed positions, the heat of a hot sun can cause shrinkage of the wood staves and consequent leakage. On no account should wooden barrels be moved by rolling them on their chime or edge, for this

causes distortion very easily; even to stand a barrel on end causes distortion in the actual act of "up-ending" it. Lack of adequate space in transport often leads to wooden barrels being stood on end in the trucks; if this has to be done, it is well to make a careful inspection of all consignments on reaching their destination to see what damage has been done. Preferably, store wooden barrels on the bilges.

It is fully twenty-five years back that the paper bag was first used as a means for "carrying" certain products of chemical nature. During that time one would have expected it to have become more widely used, but it was not until water-proofing had been perfected and the strength of the paper had been increased that the paper bag fulfilled its promise and became a valuable packing asset to the chemical industry. Its present-day uses in this connecion are much wider than might be thought, and even though paper may be listed as a material for which there are many other war-time needs, a little deeper investigation into the true economics of the case might well show that the paper bag has a claim to wider use because of the advantage it offers of enabling full use to be made of limited space on transport vehicles. It not only offers adequate protection against moisture damaging the product, but is now strong enough to withstand all but the most severe conditions of handling in transport.

Metal, in some respects, is being replaced by glass; glass demands greater care in handling, and the need for adequate packing and crating. The need for using tin in other directions, as well as the scarcity of the metal since the loss of Malay, has restricted the use of tinplate. There are other materials which might be mentioned. Industry still needs containers, and where types formerly used are now unobtainable, or supplies are strictly limited, it devolves upon users to co-operate with makers in finding new substitute materials, or types or constructions. Limitations in the use of tinplate have resulted in the use of lacquered "black" metal; impregnated paper replaces certain metallic linings; fibre containers, with metal top and bottom, have been introduced in place of an all-metal can for paint. But apart from any substitute means of packing, a great deal can be done to meet the increased demand for all types of containers, at a time when supplies are restricted, by taking more care in the handling of containers in filling and emptying, in loading and unloading during transport, and also by keeping all "returnable" containers continuously in use by returning the "empties" as quickly as possible.

Wooden Vats and Tanks

Reliance on Home-Grown Timber

THE supply position with regard to wooden vats and the effect of the shortage of imported timber was explained to a member of THE CHEMICAL AGE staff recently by a representative of Messrs. Carty and Son, Ltd., Harders Road, London, S.E. 15, who said that stocks of pitch pine were steadily diminishing and there was at present no prospect of further supplies. "The main alternative for making chemical vats is English oak, of which we have plenty," he continued. "Some vat users have already changed over to English oak, more could, and it looks as if all may have to sooner or later.

"Arising out of the need to minimise timber consumption the Timber Control recently put a ban on wooden vats, except in cases where it could be shown that alternative forms of construction, such as lined brick or concrete, were not possible. Supporting the intention behind this ban, we find ourselves in the odd position of begging our customers to go elsewhere, though we can supply them. Occasionally, we wonder whether our sacrifice has really resulted in any national advantage, as for instance recently when a substantial order for vacuum filter tanks, banned in the usual unlined wood, was carried out in rubber-lined steel—two materials instead of one, both in short supply. This was doubtless not intended by the Timber Control; it was just one of those war-time anomalies that inevitably crop up to give the aggrieved party the chance of a good grumble.

"The provisional ban on vats necessitates submission by users requiring replacements to an inquisition regarding the function of their vessels. The result so far has been a revelation, even to ourselves, of the drastic and searching processes to which wooden vessels for chemicals are usually subjected, and of the number of factors which in so many cases combine to make such vessels not merely the most effective, but the only possible form of container. This sounds perilously like an advertising puff, but will probably be recognised as sober truth by many vat users.

"The importance of trouble-free plant to chemical users who are on high priority work is obvious. Is it our trade bias, or is it cold logic, that leads us to the conclusion that as long as there is still in the country any timber of vatmaking quality, which there undoubtedly is, it could find no more effective war use than being converted into vats for essential work?" concluded Messrs. Carty's representative.

Unloading Inflammable Liquids

Tank-Car Practice in America

A PAMPHLET published by the Manufacturing Chemists' Association of America entitled "Unloading of Inflammable Liquids" recommends a useful series of instructions for the unloading of tanks containing inflammable products which are liquid at ordinary temperatures. The American interstate commerce regulations on the subject define an inflammable liquid as a liquid which gives off inflammable vapours at or below a temperature of 80°F. Many U.S. states and municipalities have stringent regulations, at least six states prohibiting the unloading of inflammable liquids from tank cars through bottom outlets; others prohibit siphoning, while elsewhere official approval must be obtained for unloading sites and installation or relocation of piping, storage tanks, pumps and other equipment used in handling these liquids.

Instructions for unloading these liquids include the direction that, except when approved closed electric lights are available, the loading or unloading of tank cars must not be permitted except during daylight when artificial light is not required. When it is necessary to discontinue unloading a tank car for any reason all unloading connections must be disconnected; all valves must be tightly closed and the closures of all other openings securely applied. All tools used in unloading cars should be of non-sparking type, and care must be taken to avoid striking the car fittings with tools or other hard objects. No naked flame of any kind, or smoking, is permitted within the vapour area of the car.

Avoidance of Static

Before any connection or contact is made between the tank car and unloading line or other unloading equipment the tank car must be grounded in an effective manner; Figure 1 suggests a suitable method of achieving this end. Permanent electrical connection by means of stranded copper, bronze or copper covered steel wire should be made between the rails on which the tank car stands and the piping to the storage tank. This connection may be made in either of two ways:

1. The rails may be bonded by means of a standard rail bond and connected to the permanent piping system with copper, bronze or copper covered steel wire (of specified type) connections at each end of the unloading section.

2. A similar connection may be made between each rail on which the cars stand and the permanent piping system.

All electric lights, plugs, motors, wiring and controls at the unloading dock and within the vapour area should be explosion-proof. Approved chemical fire extinguishers, foam generators or other extinguishing apparatus should be immediately available, and all employees should be thoroughly conversant with the use of such equipment. Safety fire blankets should be available and easily accessible at the unloading dock and near the fire extinguishers. "No Smoking" signs should be posted at the loading dock and at strategic points around the vapour area. Property around the unloading dock should be kept free from weeds, high grass and litter of all kinds.

Recommended Practice

All tank cars used for transporting inflammable liquids are equipped with one or more safety valves. At no time should any safety valve be adjusted in the field except under specific authority and instructions from the shipper of the loaded car. Some cars are equipped with an eduction or discharge pipe extending into a fitting on top of the dome which is used for top unloading. On cars equipped with both a discharge pipe and a vacuum relief valve, and where top unloading by pump or syphon is contemplated it is not necessary to remove the manhole cover before unloading. On cars not so equipped and regardless of the unloading method contemplated, opening or removal of the manhole cover must be accomplished in accordance with the following directions:—

1. *Screw Type.* Loosen cover by placing a bar (non-sparking metal) between manhole cover lug and knob. After two complete turns, so that vent openings are exposed, the operation must be stopped; and if there is any sound of vapour escaping, the cover must again be screwed down tightly and interior pressure relieved before again attempting to remove the cover. During unloading, the manhole cover must be put in place (but not entirely screwed down) in order that air may enter tank through vent holes in threaded flange of cover.

2. *Hinged and Bolted Type.* All nuts must be unscrewed one complete turn; after that has been done, the precautions described for the screw type cover must be observed. During unloading a small wooden block may be placed under one edge of the cover to provide venting.

3. *Interior Type.* All dirt and cinders must be carefully removed from around the cover before the yoke is unscrewed. During unloading the screw must be tightened so that the cover will be brought up to within 1-2 inches of the closed position.

4. *Protective Housing Type.* Remove

one housing cover pin in order to lift cover on protective housing. This will expose all the valves and fittings by means of which unloading, sampling, etc., are accomplished.

Some States and many companies prohibit the unloading of inflammable liquids from the bottom outlet of tank cars. A special device for top unloading is shown in Figure 2, and consists of a special cover placed over the opened manway; a pipe is inserted through this cover so that overhead unloading can be accomplished. The Americans recommend that tank cars be unloaded through the dome connection rather than from the bottom outlet; for this purpose, air pressure must never be used, the recommended method being by means of a pump. Consignees desiring to unload cars through the dome, by a water displacement method or with the aid of a standard system method in which an inert gas (*e.g.* carbon dioxide or nitrogen) provides the necessary pressure, should approach the shipper for details of unloading procedure. Before the manhole cover or the outlet valve cap is removed, the tank car must be relieved of all interior pressure by cooling the tank with water or venting it by raising the safety valve or opening the vent on the dome at short intervals. If venting to relieve pressure will cause a dangerous amount of vapour to collect outside the car, venting and unloading must be deferred until pressure has been reduced by allowing the car to stand overnight, or by otherwise cooling the contents. These precautions are not necessary when the car is equipped with a manhole cover which does not have to be removed to unload the car, and when pressure is relieved by piping the vapour into a condenser or storage tank. When it is required to unload cars fitted with domes, the tank car must be relieved of internal pressure as described above. With cars with protective housing, however, the internal pressure should not be relieved prior to starting the unloading operation; this type of car may be unloaded only from the top.

The sequence of operations in unloading a tank car must be strictly observed: the methods recommended for the different types of car are listed below.

A. *Unloading through top connection or through manhole with pump* (recommended method). All protective housing type cars and certain other types are equipped with eduction pipes. For cars not so equipped, it will be necessary to open or remove the manhole cover and insert a 2-in. pipe (non-sparking metal) of sufficient length, pro-

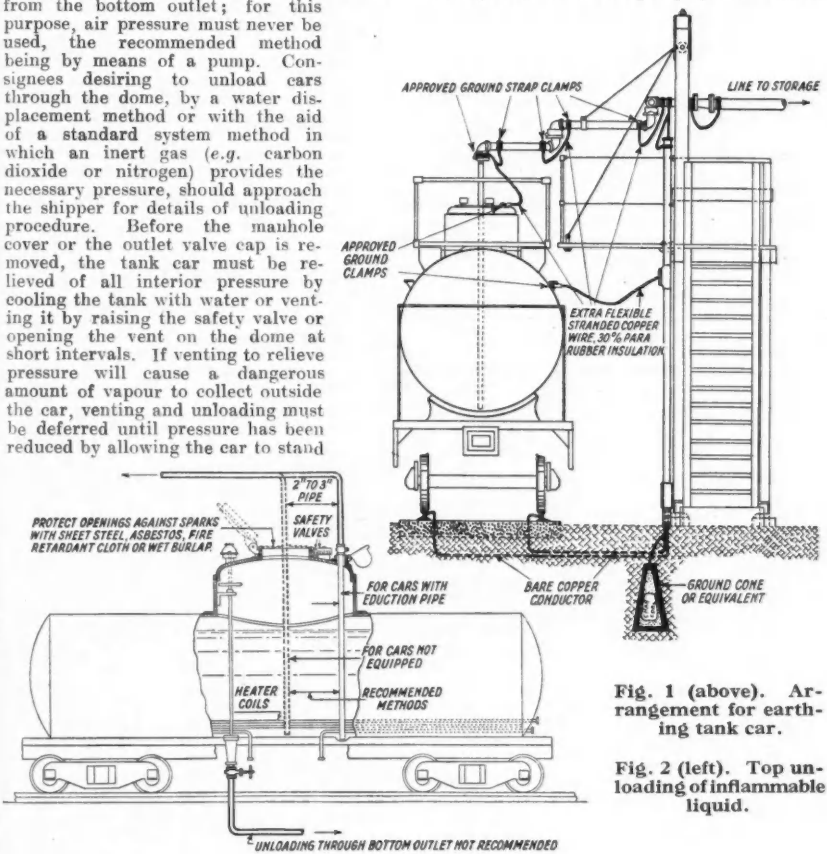

APPROVED GROUND STRAP CLAMPS
LINE TO STORAGE
APPROVED GROUND CLAMPS
EXTRA FLEXIBLE STRANDED COPPER WIRE, 30% PARA RUBBER INSULATION
2" TO 3" PIPE
SAFETY VALVES
PROTECT OPENINGS AGAINST SPARKS WITH SHEET STEEL, ASBESTOS, FIRE RETARDANT CLOTH OR WET BURLAP
FOR CARS WITH EDUCTION PIPE
BARE COPPER CONDUCTOR
GROUND CONE OR EQUIVALENT
FOR CARS NOT EQUIPPED
HEATER COILS
RECOMMENDED METHODS
UNLOADING THROUGH BOTTOM OUTLET NOT RECOMMENDED

Fig. 1 (above). Arrangement for earthing tank car.

Fig. 2 (left). Top unloading of inflammable liquid.

vided with a bracket on the lower end to keep it approximately one inch from the bottom of the car (*see* Fig. 2). Be sure tank cars are grounded and internal pressure relieved on cars with domes before any connection is made with the unloading system.

(1) Remove closure from valve through which car is to be unloaded.
(2) Connect eduction pipe unloading valve to the pump suction line and open valve.
(3) In the absence of a vacuum relief valve on dome, open the manhole cover, observing essential precautions.
(4) Start pump.
(5) After all liquid has been removed, shut off pump, close valve, disconnect plant unloading line from the tank car, replace valve outlet plug and housing cover. All other closures should then be made tight.
(6) If it is necessary to inspect the interior of the car, use only an approved flashlight. Do not enter tank.

B. *Unloading through Dome with Syphon.* (May be used only if top of storage tank is lower than bottom of tank car tank). Proceed in the same manner as described in Section A.

(1) Remove closure from valve through which car is to be unloaded.
(2) Connect the eduction pipe unloading valve to the syphon unloading system.
(3) Fill syphon tank with a liquid similar to that in tank car. As this liquid may be dangerously inflammable, care should be exercised to avoid a spark.
(4) Open unloading valve on tank car.
(5) Open valve on syphon tank.
(6) After tank car has been emptied, close tank-car unloading valve, disconnect unloading line and syphon system, replace valve outlet plug and housing cover.

C. *Unloading through Bottom by Gravity.* The discharging of tank cars containing volatile inflammable liquids through the bottom outlet is dangerous and should not be attempted even in localities where such unloading is not prohibited by statute or by ordinance. If such method must be used, extreme care is necessary. Protect car from being struck or moved from either end while it is being unloaded. If the bottom connection is torn loose, it is probable that the entire contents of the tank car will be lost.

(1) Open manhole cover, observing all necessary precautions, and leave in the recommended position while car is being unloaded, to provide venting and to keep out sources of ignition.
(2) Outlet leg valve cap or reducer must be removed with suitable wrench after set screws are loosened, and a pail placed in position to catch any liquid that may be in outlet chamber. If valve cap or reducer does not unscrew easily, it must be tapped lightly with mallet or wooden block in an upward direction. If leakage shows upon starting the removal, cap or reducer must not be entirely unscrewed, but sufficient threads must be left engaged and sufficient time allowed to permit escape of any accumulation of liquid in the outlet chamber. If leakage stops or initial rate of leakage diminishes materially, cap or reducer may be entirely removed. If initial rate of leakage continues, valve rod handle or control in dome must be operated a few times to see that outlet valve in bottom of tank is on its seat. If this fails, the cap or reducer must be screwed up tight and tank must be unloaded through the dome.
(3) Attach unloading line to the proper connection on the outlet leg.
(4) Return to dome and open bottom outlet valve by turning the valve rod handle. This handle may be inside the dome or located on top of the dome. In the latter case the handle is in the form of a hood which covers the protruding valve rod. Remove this hood, invert it, and fit it to the top of the valve rod, in which position it is used to open the valve.
(5) Open valve on outlet leg cap on cars so equipped, to permit tank car contents to flow to storage tank.

D. *Unloading through Bottom with Pump.* The hazards of pumping from the bottom of a tank car are of the same order as with gravity unloading and this method is therefore not recommended. Where regulations prohibit the bottom unloading of tank cars, they usually apply to all methods of bottom unloading. If it is necessary to use this method, the same procedure should be followed as outlined in Section C.

Containers for Canada

New Import Regulation

NEW or unused empty containers (including drums, gas cylinders, and collapsible tubes) with any type of cap, closure, or sealing device, made wholly or in part of metal and intended for packing or packaging goods for sale, storage and/or shipment, are barred from importation into Canada, except under a permit issued by the Minister of National Revenue. It was announced that the purpose of the above order is to conserve supplies and to give the Administrator of Metal Containers full control over such containers, which are in very short supply in Canada and which are vitally needed. The Canadian importer has to send his application to import metal containers direct to the Canadian Administrator of Metal Containers.

Transport by Tank Car

Increasing Use in Chemical Industry

THE field of the tank car is rapidly extending beyond the boundaries of compressed gases and liquids, and the already familiar designs seen every day on our railways can readily be adapted to the transport of solid and granular substances, such as lime, cement, and pulverised coal, that can be pumped into and out of tank cars as easily as liquids. This remark, of course, applies not only to rail tank cars, but to those mounted on road chassis. In many countries more faith is pinned to the tank car as a means of transporting liquids, gases, and granular materials than to any other form of transport, and as the demand grows for new industrial products suitable designs of tank cars are being evolved and new materials used in their construction. As an example, the concentrated hydrogen peroxide used in some bleaching operations can be carried in special aluminium alloy tank cars and so made to compete successfully with liquefied chlorine.

The use of tank cars for the transport of chlorine is well known, and the type of tank used for this work has successfully been adapted to the transport of other gases. It was originally thought, for instance, that sulphur dioxide, which has a market as a refrigerant, had to be carried in small packages to keep it dry and pure. Tank cars have, however, been designed with heating coils and proper insulation, and after heating and drying the interior of the tank, the dry sulphur dioxide is charged into it. By this means the sulphur dioxide can be delivered dry and pure at a very much lower charge. The same type of car is also suitable for carrying anhydrous ammonia.

Stainless Steel and Aluminium

The materials for constructing these tank cars gave some trouble at first, and it was doubted whether aluminium would prove practicable. To-day, however, aluminium tank cars are employed for carrying acetic anhydride, glacial acetic acid, formaldehyde, concentrated hydrogen peroxide, and glycerine. One large American producer of glacial acetic acid is using aluminium tank cars with great success. It was originally thought that it would be impossible to construct an aluminium tank to carry as much as 8000 gallons of glacial acetic acid; the excessive vibration to which a railway tank car is subjected might crystallise the aluminium, and then the riveted joints would leak. These difficulties, however, have been overcome, and transport of glacial acetic acid in aluminium tank cars is being carried on regularly and successfully.

Another example is afforded by glycerine. Because of the risk of contamination by rust, the glycerine used in medicinal products must usually be carried in glass bottles, with the usual difficulties and trouble of loading them into wagons, and the constant danger of breakage. Aluminium tank cars are being used successfully for handling this substance, and the purity of the glycerine after such transportation is equal to that formerly delivered in glass bottles. Formaldehyde, when transported in steel tanks, is often delivered to the user contaminated with rust. Insulated aluminium tank cars have overcome this difficulty, and in view of the increasing number of applications being found for formaldehyde (including manufacture of inks, artificial leathers, photographic films, and plastics), the new method of transport is of importance. With the development of new stainless steels and stainless iron, nitric acid can now be carried in special tank cars of stainless steel plate, and it is reasonable to assume that carboys, which have always proved a source of trouble both to acid manufacturers and to the railway companies, will one day become obselete. Water-white sulphuric acid, which has been carried in carbon steel tank cars, will not cause serious corrosion if dry, though it generally discolours. On the other hand, when stainless steel is used the acid is not discoloured.

Tanks for Caustic Soda

Although chemical apparatus, designed specially to resist corrosion, has been evolved by the use of lead linings and copper, nickel, rubber, and glass coatings, attempts to employ these coverings for tank cars have not proved entirely successful, owing to the inevitable vibration and shock which injure the linings. Tank cars lined with nickel, however, have proved valuable in the transport of caustic soda for the manufacture of viscose rayon. In the viscose process the caustic soda must necessarily have a low iron content, and accordingly, caustic soda is often purchased in the solid or fused form in order to ensure purity, and not converted into solution until it arrives at the rayon works. Obviously, the purchase of caustic soda in liquid form would prove cheaper for the rayon manufacturer, and this saving of expense has been made possible by using tank cars which are completely lined on the inside with nickel. This nickel-clad steel is a hot-rolled plate made up of a layer of pure solid nickel and a heavier layer of high-grade flange steel. In the hot-rolling process the nickel is welded to the steel, and the plates are then riveted with pure nickel rivets. Where absolute protection is not essential, the inside of a carbon steel tank can be sprayed with

aluminium, tin, zinc, or copper, using one of the metal-spraying processes which have proved successful in other spheres of industry. Though these coatings are to some extent porous, they can be used for transporting weak acids and some syrups.

As mentioned earlier, it is possible to transport granular materials in tank cars, and they are, indeed, being used for carrying wheat in America. The pumping of granular substances, such as special type sands, pulverised fuel, and various industrial powder, is nothing new, and by aerating heavy powders, such as Portland cement and felspar, these, too, can be pumped in and out of tank cars.

Chemical Containers in America

Economy Measures Recommended

PACKAGING difficulties are no less acute in America than in Britain. As soon as the impending shortages of raw materials for container manufacture were recognised as inevitable the American Government set about finding means of coping with the situation. Standardisation of drum sizes was one of the first steps to be taken, and 5-gallon and 55-gallon single steel drums become standard containers for liquids, except for aqua ammonia and hydrofluoric acid, for which the 110-gallon and 20-gallon drums remained in use. Drum users started to look around for non-metallic substitutes, but little progress was made. It was during this period that the Containers Branch of the War Production Board was set up; its task was to deal with the whole of the containers field, not merely chemical containers. According to a recent article by Richard M. Lahey in *Chemical Industries*, the Containers Branch consulted the drum manufacturers, and an advisory committee of steel drum makers was set up which proved of considerable assistance in meeting the situation. It did not have, however, the assistance of those individuals in chemical companies who had an intimate knowledge of steel containers and possible substitutions. Eventually, conditions reached the point where light-gauge drum plants operated by chemical companies were unable to get sufficient steel drums to pack their production of caustic soda and other chemicals. The position became so serious that the Chemical Branch of the War Production Board had to appoint a containers section of their branch to deal with the special problems of the chemical manufacturer.

A Vast Variety

The head of this container section of the Chemical Division, Donald Knapp, provides some interesting details about the present position in another article in *Chemical Industries* (February, 1943). He states that the containers section is interested in everything from ampoules, through bottles and glass carboys, to steel tank trucks. The chemical industry requires paper bags, cans, fibre drums, and wooden boxes; it uses blackplate, tinplate, and terneplate cans, steel drums of all sorts and sizes, low pressure and high pressure gas cylinders, and tank cars of various types.

One order which Mr. Knapp's section has brought into effect forbids the packing of certain chemicals in steel drums. The order does not prohibit the sale of drums in any way, but it does require that any drum that is sold shall be marked with an "X." It is the responsibility of the packager of the drum, not the seller of the drum or the users of the packed product, to see that steel drums are used only when no non-steel substitute is available. The purpose of the cross on the drum, writes Mr. Knapp, is to "police" the order; certain specified products must not be packed in drums marked with the cross unless they are intended for the Army, the Navy, or one of three other agencies specified by the Director General for Operations.

Economy in Steel

Mr. Knapp quotes the example of one large manufacturer who cut his purchase of metal containers from 77 per cent. of his annual container requirements to 13 per cent. by the maximum use of fibre drums and wooden barrels. Another example he gives is the case of a manufacturer of a liquid insecticide who needed tin-lined steel drums for an insecticide important to the health and comfort of the civilian population. The manufacturer turned over to glass carboys. The cost was higher and the package not as convenient, but it did deliver the product in a usuable form.

Chemical companies are finding that Bessemer steel sheets are suitable for making containers for caustic soda and other light-gauge drums. As Mr. Knapp comments, more care has to be taken in using Bessemer steel than would be necessary with open hearth steel, but he recommends every chemical manufacturer who makes his own drums or who purchases sheet iron drums to look into the possibility of using Bessemer steel to relieve the steel shortage. He also indicates the possibility of developing new substitute materials that will cost less, and be stronger and lighter, than those with which we are now familiar. Combinations of fibres and plastics to form new materials

for the manufacturing of cans on existing equipment, with only slight modifications, are not beyond the realm of possibility for packing such products as paint, motor oil, anti-freeze, and turpentine. Plywood bound with phenolic resins offers prospects; in America there is now a plywood dustbin which is water-tight and capable of withstanding boiling water or steam for sterilising purposes; and a useful container could be based on the same material. Paper bags have improved beyond all recognition, and to-day it is impossible to purchase bags that can be submerged in water without damage to the contents.

Economy of gas cylinders is urged in America, as it is in this country and the demand is tremendous. "Quick turnover" is the order of the day. Mr. Knapp's advice to American chemical firms is this: "Get your cylinders into circulation, turn them over rapidly, purchase your requiements only as needed weekly or more often if practical. In this way you can ensure a supply of gases.

Rapid Turnover

"Three years ago one manufacturer averaged two turns a year on acetylene cylinders. He is now averaging nine. Another manufacturer averaged four turns a year on oxygen cylinders. He is now averaging twenty-four. The best and safest way to insure a constant flow of these important gases through your plant is to see that no cylinder is allowed to stay in an inactive capacity for twenty-four hours. Your cylinders are very much like your labour. We cannot afford the luxury of absenteeism when fighting a total war. Many of the firms in the compressed gas industry have set almost unbelievable records of increased production with existing equipment," he concludes.

Care of Steel Drums

It is also stressed in the U.S.A. that the proper care of steel drums is the duty of all users whether they be owners of the drums or customers to whom they are shipped. The 18-gauge 55-gallon drums, used by most shippers as one-way containers before the war, have become returnable containers. As the small openings in these drums are pressed in or mechanically inserted, the insertion and removal of the plugs and the use of spigots for discharging the contents require special care if these drums are to last. The Manufacturing Chemists' Association has, accordingly, issued a manual recommending a standard discharging tap and a standard practice for discharging drums. It is pointed out in this booklet that the practice of using taps with tapered shanks leads to leakage, very often as a result of forceful efforts on the part of the consumer to get a tight fit. This may cause stripping of the threads, either in the shank or in the drum flange, and may even in extreme cases loosen the drum fitting, which, of course, ruins the drum. It is, therefore, urgently recommended that only taps with 0.75 in. straight threads be used, accompanied by a resilient gasket to ensure a tight fit, and that taps should be made of a metal or alloy that can withstand the chemical action of the commodities with which they are to be used. This all sounds simple enough, but dilution of labour is practised in America as well as here, and what seems elementary to the "old hand" has still to be taught to the tyro.

A SMALL PORTABLE CONVEYOR

THE accompanying illustration shows a small and very portable conveyor specially designed to facilitate the loading and conveying of heavy objects or packages where no loading dock is available and the work has to be carried out by female labour. The girls in the picture are loading heavy ammunition boxes with great ease and rapidity.

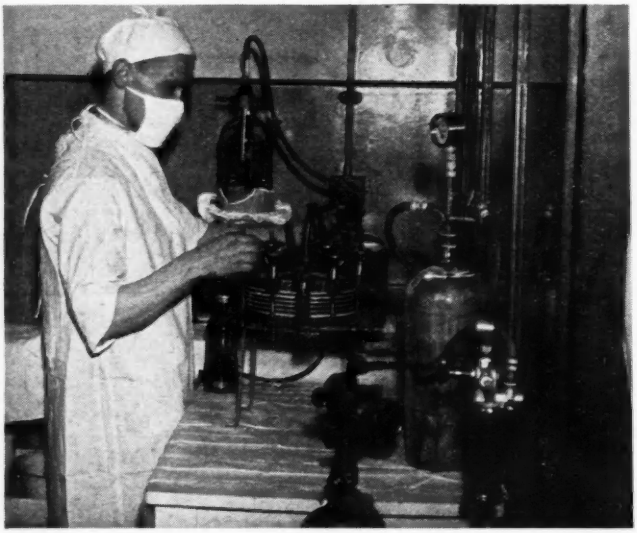
The makers, T. & T. Works, Ltd., of Billesdon, Leicester, have designed a utility model which, while very light and efficient, is built with a view of avoiding supply difficulties. Very good delivery can be given of a wide range of designs, conveying all classes of materials or packages to any height or distance.

Glass Containers at the Front

Indispensable for Blood Transfusion

THE carboys, demijohns and Winchesters produced by John Kilner and Sons (1927), Ltd., of Wakefield, are well known to all users of glass containers. An interesting fact of the many-sided war-time activities of this firm is the manufacture of glass containers essential for the nation's Blood Transfusion Service. This war, with its far-flung battle fronts and its furious aerial bombardments, has led to the development of a blood-transfusion organisation which dwarfs the service built up in the last war which made steady progress in the inter-war years. Today, whole blood, blood plasma and serum are handled in enormous quantities. At every stage in this flow of blood outside the human body, glass is used as it provides the most convenient and hygienic medium for every operation connected with blood transfusion. Most people, by this time, are familiar with the small pulp bottles of characteristic shape which are used as containers for whole blood, liquid plasma, and dried plasma. Racks upon racks of these bottles are to be seen at any centre where blood plasma is stored against emergency, and photographs of the blood-transfusion service in action on the field of battle show these bottles, packed into metal crates resembling those used by dairymen, much in evidence.

In the laboratories which prepare dried plasma and serum, a wide range of glassware is needed. Special Winchesters, of 4-5 litre capacity, are found very useful in the semi-large-scale processes by which plasma and serum are prepared. These processes require aseptic conditions; sterilisation is achieved by autoclaving and Winchesters are capable of being heated by steam at a pressure of 20 lb./sq. in. These glass containers, too, have the advantage that they can be sealed with the same aluminium cap which fits the standard Medical Research Council blood bottle. Other glass articles to be met with in blood transfusion laboratories include carboys of 20 and 40 litre capacity, used for containing distilled water, and 4-20 litre demijohns. For all these bottles Suba-Seal fittings can be provided.



A large range of glassware is used in laboratories producing plasma for blood transfusions. Three types of glass container are seen in the photograph, which shows the filtration process. The apparatus in the centre is a Seitz filter lent by the University of Toronto and flown to England by the R.C.A.F.

New oilfields in Northern Albania, near Kruja, and also in the Mati Valley are reported in the *Krakauer Zeitung*. They are said to extend over an area of 3000 hectares and to be considerably larger than those at Devoli. The surveying commission stated that borings on a large scale must be carried out before the industrial and commercial importance of the new oilfields can be established. Analysis of the oil-bearing sand in the districts surveyed has proved the presence of heavy oil with a specific gravity of 0.99.

Chemicals on the Road

Transport of Chemicals in Bulk

PRIOR to the outbreak of war, there had been a continuous increase in the demand for tank wagons for the conveyance of liquid and semi-liquid raw materials. War-time requirements have intensified this demand partly because of the increased production of such materials and partly because of the difficulties experienced in obtaining new containers or the return of empties, coupled with the shortage of labour for the handling of the containers.

Tank manufacturers and haulage contractors supplying road tank wagons have also had their difficulties to face and, as a result, although there has been the room for development in the design of the tanks and in the metals used in their manufacture, it has not been possible to put these developments into effect to any great extent.

Fig. 1.—Large general-purpose tank wagon, built specially for the carriage of liquid caustic soda and crude glycerine. It was one of the earliest built gas-producer vehicles.

Modern tanks are greatly improved in design in comparison with the tanks first used in this branch of the road haulage industry. The earliest tanks, used for carrying petrol, were limited by statutory regulations to 500 gallons per compartment with a total capacity of 2500 gallons, and these were usually constructed of ¼ in. plate with riveted seams and with the manhole covers held down by 24 bolts. When it was decided to carry other liquids it was also decided to increase the size of the compartments, since these and the total capacity were not limited for other liquids. At the same time it was considered necessary to fit baffle or wash plates inside the tanks, to overcome the anticipated surge, which it was thought might tend to make control of the vehicle difficult, and to strengthen the compartments. The tanks still had riveted seams and with the baffle plates and projections caused by the riveting it was found very difficult to clean the tanks when changing from one liquid to another. Moreover, the process of undoing and afterwards doing up 24 bolts each time the manhole cover was removed to allow of an inspection, coupled with the fact that the presence of baffle plates prevented a thorough inspection without getting inside and literally crawling through the tank, soon brought the realisation that these features would have to be eliminated, if possible. This has now been done in the case of tanks unloaded by mechanical pumps or by a factory pump, and the modern tank for the carriage of chemicals and similar liquids is a vessel, sub-divided into compartments if necessary, having a smooth interior with welded seams without baffle plates, these being replaced for large compartments by strengthening rings on the exterior, and hinged manhole covers with a simple locking device. This type of tank is easy to clean and easy to inspect. The possibility of damage from the surge or wash of the load has been practically eliminated by the use of different sized tanks and experience has shown which are the most useful sized compartments for large tanks so that, according to the load, each compartment can be fully loaded. Tanks discharged by pressure must still have the manhole cover bolted down and well sealed to prevent leakage of pressure, but tanks of this type are mainly used on articulated vehicles, where different tanks can be kept for different types of liquids, thus avoiding the necessity for frequent cleaning and inspection.

During the development period the thickness of the mild steel plate used had been reduced in order to bring the unladen weight of the vehicle as low as possible, and at one

time ½ in. plate was being used. Experience showed this to be too fragile in view of the strains and stresses to which a tank on a road vehicle is subjected, and the tendency now is to use 5/32 or 3/16 in. plate as being the lightest but most durable. Stainless steel and aluminium tanks are of different gauge varying with the capacity of the tank. A small aluminium tank may be of 10 gauge, while a stainless steel tank of similar size might be 12 gauge. For a large tank, 3/16 in. aluminium would probably be used as compared with 12 gauge stainless steel.

Fig. 1 illustrates what might be termed a large general-purpose tank wagon, which was put into service just before the outbreak of war. The total capacity of the tank is 3250 gallons, divided into three compartments. The centre compartment holds 2000 gallons with a 750 gallon compartment at one end and a 500 gallon compartment at the other. This tank, which is of 3/16 in. mild steel, was designed primarily for the carriage of caustic soda liquor and crude glycerine. The centre compartment, when filled with such liquids or with liquids of the same specific gravity, gives a pay load of approximately 13 tons and the tank is so mounted on the chassis that the axle weight are kept below the permitted weights. If lighter liquids are to be carried the use of one or both of the other compartments permits the full weight to be carried with either two or three compartments filled. In this way any surge is eliminated so that baffle plates are not required and, being a welded tank, the interior is perfectly smooth. Manholes of 16 in. diameter with hinged covers are built in the centre of each compartment and consequently the interior can be easily cleaned, and what is equally important, easily inspected from the outside. Being perfectly smooth, the interior of the tank could readily be lined if it was required for the carriage of liquids which would attack mild steel. The tank is lagged with 3 in. of "Alfol," so that it can be used for carrying and delivering materials in a molten state, but at the same time the lagging does not preclude the tank from being used for cold liquids. The outlet valves are fitted flush to the base of the tank with a view to avoiding any solidification of heated materials in the outlet pipe. Each compartment has a separate outlet, but these can be quickly joined together if the tank is fully loaded for delivery at one point. For discharging the load, a 4 in. Albany pump is fitted which is power driven off the gear box. With this pump a load can be delivered to a height of 20 ft., in from ¾ to 1 hour.

In addition to the general chemicals which can be carried in bulk such as sulphuric acid, nitric acid, acetic acid, industrial alcohols, coal-tar products and vegetable oils, the necessity for salvaging and subsequently refining used chemicals has increased the demand for tank wagons. Spent chromic acid solution, soap or spent lyes, ammoniacal liquor and used lubricating oil are all collected by tank wagons and returned to refineries so that any material still of value can be used again. Distilled water has also been carried in large quantities during the war and for this purpose aluminium or stainless steel tanks are generally used.

Although the development of road tank wagons has to a large extent been brought to a standstill as the result of the war, it is highly probable that experimental work being carried out in other directions will have a considerable influence on both the design and fabrication of tanks after the war. Before the war, in addition to tanks made of mild steel, stainless steel, and aluminium, some were lined with such substances as tin, rubber, and ebonite. Glass linings had in many cases been replaced by stainless steel tanks, but the shortage of all these substances has entailed the use of other linings, and a coating of synthetic resin bases is being used increasingly. For the same reasons the use of stoneware and plastic containers has been considered for certain chemicals.

Fig. 2.—Mild steel insulated 3,000-gallon tank, fitted with mechanical unloading pump. It is used extensively for decanting from rail tanks consigned to firms with no rail connection.

Fluorspar in Derbyshire

Modern Development of Available Resources

by WILLIAM BRAITHWAITE

(*Metalliferous Mines Agent, James Wilkinson & Son, Limited*)

AS specialists in the manufacture of hydrofluoric acid and fluorides of all strengths and classes, fluorspar is of vital necessity to this most important section of our industry. In consequence of the present national requirements of certain fluorides, the manufacture of other types less urgently needed for the successful prosecution of the war has had to be severely curtailed, hence the present inability always to satisfy quickly the demand for the latter.

Some years prior to the outbreak of war we foresaw the potentialities of the uses of hydrofluoric acid and fluorine compounds of all descriptions, and after a most careful study of the whole position, came to the conclusion that one of the major obstacles to be faced was the supply position of the raw material—fluorspar. A survey of economically suitable sources of supply was disappointing as the results showed that these were strictly limited to the selection of old miners' refuse dumps which had accumulated when the lead mines in Derbyshire were last worked commercially, towards the close of the last century, when fluorspar was of very little consideration. Such hillocks were robbed of the majority of the purer fluorspar for home and export requirements during the 1914-1918 war and this increased the difficulties of selecting high-grade fluorspar essential for our purposes in the days following that war. However, we succeeded in obtaining supplies until the trade revival about 1935, when the demand for the metallurgical grade of gravel spar vastly increased, and it suited producers better to supply this rather than our comparatively small requirements of selected high-grade material. We already knew from the evidence of the old miners' refuse dumps that both fluorspar and galena of excellent qualities had existed and might still exist in the strata in this area, and this apart from the widely varying and ofttimes misleading recorded and verbal statements which have appeared and been related in the past.

Local Investigations

In these circumstances, and also in view of our own increasing consumption of high grade fluorspar, we decided firstly to investigate on our own account the possibility of mining fluorspar in Derbyshire in conjunction with lead sulphide, in the nearest likely source of supply to our chemical works, these two minerals were closely associated. This also would give two saleable products as against the old miners' proposition of one only, *i.e.*, galena.

The question from the mining point of view was why did the mines cease to be operated. Various explanations, too numerous to record here, have been offered by the various people concerned. We considered these carefully and came to the conclusion that the most likely was that the mining properties in this district had possibly been worked to their economical limit with the plant, equipment, and mining methods available to the mining concerns of that period. If this assumption proved to be correct, then we argued that in the half-century or more during which the mines had been derelict, vast improvements had been made in equipment and everything connected with mining, and, given the most modern plant and equipment, etc., we should be able to carry the old miners' efforts a considerable step further. Late in 1938 we decided to adopt this policy.

Old and New Workings

The ancient and antiquated Lead-Mining Laws peculiar to the district were complied with, and investigations started. The shaft is vertical, egg-shaped (as is usual), approximately 8 ft. by 5 ft. by 320 ft. deep. There are old workings at 240 ft. deep and at the bottom of the shaft. At 280 ft. we decided to make an entirely new drift in virgin ground. All drilling equipment is driven by compressed air, otherwise electricity is our main power. Haulage underground is by storage battery loco and on the surface by internal-combustion engined truck. All equipment is most modern. We discovered underground, to our amazement, the thorough manner in which the old miners had sought and recovered the galena and along with it the bulk of the fluorspar. The underground workings were much more extensive than one could have imagined when considering the plant and equipment and mining methods available at the time these operations were carried out.

It soon became apparent, however, from the condition and state of the mine, that to complete a thorough investigation upon which could be based the decision as to whether the mining project should proceed or not, would take more time than we could afford in view of the shortage of high-grade fluorspar, and even if we decided to continue with mining operations there was the

additional time required to rehabilitate the old workings, with no plan or authentic guide, and also to instal the necessary plant and equipment. To bridge the gap, we turned our attention back to the old hillocks, and, by treating the inferior ore left in these, we obtained what supplies of high-grade fluorspar we required. Up to the end of 1942 old workings had been cleaned up and prospecting done to the north, east, and west of the mine shaft. In addition to actual drifting we had carried out extensive diamond drilling. Up to the present time several pockets of mineralised ground have been discovered, but these, added to the dubious quantity of mineral left on the sides of the old workings, while forming some reserve of ore, do not constitute anything near a safe working reserve.

Since the beginning of 1943 our prospecting operations have been, in part, in hitherto uncut ground, and the results have certainly been more encouraging. It is hoped that by the end of this year it will be possible to form a definite idea as to the accessibility and recovery of the remaining lead (galena) and fluorspar deposits in this district, from a commercial point of view, with the aid of modern equipment and mining methods at least down to the 50 fathom level of our possessions.

Treatment of Crude Ore

To-day, with the advent of flotation, the main requirement of fluorspar can, broadly speaking, be divided into two groups. The first and by far the greater is metallurgical grade, round about 85 per cent. CaF_2, with 5 per cent. silica, in gravel form with a limit to the percentage of minus ¼ in. material. To meet this specification it is generall found necessary to concentrate the crude fluorspar ore by gravity separation, necessitating washing and crushing to the maximum possible sizes, within the limits of the specification, to free the fluorspar and create the minimum amount of material below ¼ in. size unsuitable for the steel industry. Despite appreciable improvement in this connection recently the percentage of small material created is still far too high. The grade of these fines is also inferior to the gravel concentrate as they are discharged still mixed along with the general fine gangue which, of course, includes the colloids.

The latest development, which is worthy of close investigation, is the concentration of these fines by the tabling method subsequent to cone classification, and, provided that an economical recovery of satisfactory grade fines could be attained, a final briquetting of the same to the desired size. If successful it would greatly reduce the present unavoidable waste of fluorspar at treatment plants at present confined to producing metallurgical gravel fluorspar.

The second requirement is for a much more refined and higher grade of fluorspar to satisfy such industries as the chemical, ceramic, and glass obscuring, and more recently refining of aluminium and alloys, etc. The present acknowledged separate specifications for each of the above vary between 92 and 95 per cent. CaF_2, so that a standard guaranteed fluorspar of 95 per cent. minimum CaF_2 with maximum 1 per cent. each of barium sulphate and carbonates, and 0.5 per cent. maximum silica, with only traces of lead and other impurities, and dried to a maximum 1 per cent. of moisture content covers the whole field and obviates the necessity of producing a separate product for each. The cost of producing such a standard concentrate as against several separate concentrates works out more economically. This standard specification is now attained by flotation, and the bulk of the concentrate reaches 97 to 98 per cent. CaF_2.

It must, of course, be clearly understood that the process of flotation of fluorspar, to be economic, demands that the feed be ground to minus-48 mesh maximum. This size is not determined by the mesh size at which the CaF_2 becomes free as in gravity separation. There are also several other important factors for satisfactory efficiency in flotation, knowledge of which can be obtained only by practical experience. These factors vary considerably according to the make-up of the original feed ore. Unfortunately, it is this essential t oflotation fine grinding which limits the uses of this high-grade fluorspar to the relatively small present requirement. Many other industries desire a high-grade fluorspar but in coarser form.

Briquetting Problems

The suggested briquetting is not applicable to this high-grade fluorspar, as the reagent for this purpose constitutes an impurity, thereby reducing the CaF_2 value to below the desired percentage. The best result so far obtainable by briquetting this high-grade ground flotation concentrate is around 90 per cent., and while this would be eminently suitable for the general metallurgical industry and a vast improvement on the present-day supply of variable gravel, it is doubtful whether the advantages thus gained would balance the much higher cost of flotation and briquetting. However, this is a development which should receive careful consideration.

It will be seen from the foregoing that economical recovery of high-grade ground fluorspar to a guaranteed analysis of 95 per cent. minimum CaF_2 with a substantial percentage of concentrate between 97 and 98 per cent. CaF_2, in this country is now established, and the demand for high-grade ground material is fully satisfied.

Chemicals in South Africa

The Search for Substitutes

(From Our Cape Town Correspondent)

FURTHER results of the chemical research carried on by the Leather Industries Research Institute at Grahamstown (*see* THE CHEMICAL AGE, November 14, 1942, p. 427) has contributed towards the solution of many of the Union's current difficulties in chemical supply. The development of a growing munitions industry, in addition to the normal mining demands of the country, has meant that there is an increasing shortage of acetone, particularly in the local leather industry. This industry is now finding suitable substitutes in two mixtures. The first consists of equal parts of ethyl acetate and methylated spirits; the second is a mixture of equal parts of ethyl acetate, methylated spirits and benzene. The raw materials are obtainable, because ethyl acetate and methylated spirits are made in the Union. At the same time, investigations have been made into chemical processes for the manufacture of substitutes for rubber latex. The substitute that has been developed is being tested under factory conditions and is recommended for certain footwear processes. It is not, however, considered the ideal substitute and consequently further experiments are being conducted. The Research Institute, at the request of the Meat Control Board, has also been devising methods of producing albumen from the waste blood at abattoirs, and of neatsfoot oil from greases and fats.

During the past year there has been a heavy increase in the South African consumption of cyanide, particularly on the gold mines, which annually require several thousand tons. Only small quantities of such chemicals are now being imported, which means that the local industry is now striving to serve the total needs of the mines. The basic raw material, ammonia, is being taken from the atmosphere and the sodium needed is obtained from common salt manufactured locally.

Tobacco Extract

Existing import difficulties promise a better future for the tobacco extract produced on a small scale in South Africa. In several industries it is thought that this might be used as a substitute material for chemicals previously imported. Scrap tobacco is used in this process. Normally, considerable difficulty is encountered in treating and marketing the product, and even now the factories are receiving little official encouragement, as it is felt there is too little waste tobacco of high nicotine content to make such an industry profitable. It is feared that under more normal trading conditions it will not survive.

Natal sugar cane is being used to an increasing extent to produce power alcohol, but it cannot be said that this type of fuel is making much headway among private motorists. It is being insisted that a compulsory mixing of petrol and power alcohol would help to relieve the present shortage, but the Government does not appear to be sympathetic towards the scheme. In view of the present shortage of maize it has refused to consider any preparation of power alcohol from maize.

Whiting Manufacture

Among other new South African products is the whiting now manufactured at Potchefstroom. Graded according to fineness, the first grades are being sold to the rubber and paint trades, and the second grades to those industries which can use a coarser product. The plant now has an output of about 400 lb. a month. As the demand develops this will probably be increased considerably. Many drugs and chemicals once used lavishly in South Africa are now in short supply. Attempts are being made to compensate for some of the deficiency by local manufacture or the use of substitutes that are still plentiful. At the same time the Controller of Medical Supplies has been asked to give a low-rating certificate of essentiality in regard to a number of drugs and chemicals that are now unprocurable. More attention is also given to local sources of raw materials. Included among the South African herbs to which special attention is being given is buchu, which in spite of its valuable medicinal properties has not been used as much as might have been expected. It is much used in the country districts, but export fell off with the discovery of a synthetic substitute. Growers now expect that the local demand will last out the war.

Wide Usage of Salt

South African salt is now being used extensively in a number of industries, including food preservation, hide and skin curing, dairying, electrolytic manufacture of sodium and chlorine, sodium carbonate and bicarbonate manufactured by the Leblanc and ammonia soda processes, caustic soda, sodium sulphate and bisulphate for glassmaking, soapmaking, etc. Industries preparing materials for other industries are also using quantities of coarse South African salt. Chlorine, for instance, is needed for making baking powder and bleaching powder, for sterilising water, and as a disinfectant. As a result of this development extensive production of chlorine may well be attempted.

A CHEMIST'S BOOKSHELF

THE METABOLISM OF FAT. By Dr. Ida Smedley-Maclean, F.I.C. London: Methuen. Pp. 94. 5s.

There can be few scientists who do not possess several of the little Methuen monographs that so successfully combine compactness with comprehensiveness. This latest volume, by a recognised authority on fat biochemistry, has all the good qualities of its predecessors. The student will find in it an adequate survey of the processes by which fat is synthesised from carbohydrates, digested by enzyme action, and deposited in the tissues of the body from the fatty acids circulating in the blood stream. A good account is given, too, of the oxidation of fat to provide energy for the animal's movement. Descriptions are given of the various techniques for "labelling" fats, such as those using heavy hydrogen and radioactive phosphorus, which make it possible to study the progress of the fatty acids and phospholipins. The older scientist will find the book a useful guide to the literature on fat metabolism, for nearly two hundred references are contained in its 7-page bibliography; the latest reference is dated 1941, the first 1868, which gives an indication of the amount of trouble the author has taken in providing the fullest information in the smallest possible space.

DICTIONARY OF ORGANIC COMPOUNDS—Volume I, Revised Ed. Edited by I. M. Heilbron and H.M. Bunbury. London: Eyre and Spottiswoode. Pp. 1072. 6 guineas.

Even in peace time the revision of this three-volume dictionary would have been no small task. The war has made the work many times more difficult for the two editors and their score of contributors, who have revised and rewritten the first volume of this invaluable reference book that makes it easy to find details about even the most abstruse substances. In the foreword it is stated that the war has made it impossible to revise the two other volumes for the present. However, since the original edition is now out of print, it has been decided to reprint Volumes II and III, without revision but with the addition of supplements that will bring them up to date. Its use as a reference book is simplified by the fact that the chemicals are listed in alphabetical order, so that the dictionary forms its own index. Under each chemical are given the constitutional formula and its physical and chemical properties. Functional derivatives, as distinct from substitution compounds, are given under the parent compound, except where they are sufficiently important to justify separate inclusion as principal references; the extent of the detailed information about derivatives that is provided may be judged from the fact that the paragraph on benzene is followed by 38 pages containing particulars of benzene derivatives! The references to relevant literature which are given for all except the commonest compounds, like acetone, are useful, as they have been chosen as describing the best methods of preparing the chemical.

STARVATION IN EUROPE. By G. H. Bourne, D.Sc. London: Allen & Unwin. Pp. 144. 5s.

An effective cure for complaints directed towards the ukases of Lord Woolton is provided by a glance at the illustrations of Dr. Bourne's latest publication. They afford a horrific indictment of the Nazi "New Order" in occupied Europe, and are ably seconded by the dispassionate marshalling of facts in the accompanying text. The worst starvation of all is to be found in Poland, notably in the "Government General" and especially in the Warsaw Ghetto. In this last stricken area, where terrible housing and sanitary conditions compete with the food shortage as agents of death, the mortality figure in May, 1941, was 5000 (120 per 1000 per annum), while in the Lodz Ghetto, in the first three weeks of the same month, 1080 Jews died out of 150,000, whereas there were only eight births. These are just a few figures selected at random; many other instances will be found in Dr. Bourne's pages, including some interesting statistics of the increase of the mortality figure for certain diseases in countries where actual starvation is not so pronounced.

As a specialist in nutrition, Dr. Bourne has analysed the diet deficiencies principally involved, and he recommends a plan to be followed by the United Nations when the time comes to rebuild Europe. Everyone here, for example, must realise that rationing may have to be severer even than in war time during the six months or a year in which the demand for shipping to take food to starving Europe will be at its most urgent. Concentrated vitamins in synthetic form can be flown to the hardest-hit areas, and dehydrated food can help greatly. If the better-off nations can get into the habit, as it were, of helping the poorer ones, however, the task, herculean though it may appear, can yet have a permanent good effect upon the history of humanity.

Fifty tons of manganese, recovered from low-grade ores by use of the U.S. Government-patented electrolytic process developed by the Bureau of Mines, has been turned over to the Treasury for lease-lend and use in nickel coins, which now contain 9 per cent. Mn, 35 Ag, and 56 Cu, so saving both copper and nickel.

Mica Trade Association

American Delegates Entertained

THE recently-formed Mica Trade Association has shown rapid signs of activity by entertaining the Mica Mission from the U.S.A. to luncheon, the occasion having been celebrated at the Savoy Hotel, London, on Tuesday last week. Mr. D. Bruce Scott, vice-president of the Association and chairman of the Management Committee, welcomed the American delegation, headed by Mr. Given. He understood that the main purpose for which Mr. Given and his colleagues had come to this country was to study our uses of mica and to see whether it was as economically used as in America. In mica, the United Nations were more fortunate than in the case of some raw materials, with access to the main sources of supplies throughout the world, but these supplies must be conserved and put to the best use for the war effort. Whether, and how much, of the raw material should go to the United States or to this country was, to his mind, immaterial, so long as it was directed to the spot where it could be used with the greatest possible use to the furtherance of the war effort. It was with that in mind that he said to Mr. Given and his colleagues: "Go forth upon your travels and see how we work."

War-Time Controls

Included among their guests they had representatives of the Ministry of Supply, from whom they wanted a continuance of the happy relations which had existed between the Ministry and the Association. It was started by Mr. Sayers and had been ably continued by Mr. Burgess. He did not want to give them the impression that the Ministry gave them *all* they wanted, but when they did say "No" they did it in such a way as to leave the impression that they were doing them a favour. War time brought, or created, conditions which made controls or State interference necessary. The control of mica had put some of their members completely out of business, but they had accepted that as part of the price of victory. Controls in themselves were the negation of liberty and there was a strong tendency for them to create a regimented thought similar to that which we were fighting against. The commercial greatness of this country and of America was built up through the adventure and foresight of the ordinary man in trade and industry, and on behalf of the Association he would say that one of the things they would do when the war had been won was to fight strongly for the quickest possible removal of the barriers which restricted trade and private enterprise.

Mr. W. J. Given, chairman of the U.S. Mica Mission, responded. He stated that they had come to this country rather as students. Britain had had four years' experience in the war; they in America had scarcely begun, and they were here to learn, so that they might go back and carry on the battle of production with augmented knowledge.

An Independent View

Mr. G. F. A. Burgess, Mica Controller, who described himself as one of the nuisances referred to by the chairman, in proposing the toast of "The Mica Trade and Industry," said the fact that he had had little or no connection with mica before he became Controller a few weeks ago provided him with the opportunity of looking into the future with a rather more independent view than was perhaps possible for some of them, and this fact led him on to the post-war question. There were a number of Jeremiahs in the country going about saying that when the war was over we should all be broke and the standard of living would fall. It was quite true that there would be a redistribution of income but he took wholly the opposite view from the Jeremiahs. History showed—and this war was showing particularly—that the urge given to scientific development by a major war was something colossal and it was quite clear that the enormous scientific advances made in this country were going to produce a permanently increased standard of living throughout the world. Mica as a commodity was likely to benefit from the great developments in the electrical and radio industries.

Co-Prosperity

Sir Geoffrey Winterbotham, replying on behalf of the mica trade and industry, pointed out that if it had not been for control the Mica Trade Association would not have been born. It must be the only instance on record of control assisting a birth instead of preventing it. The formation of an association was planned long ago, but it took the imposition of control to satisfy them that co-operation among all sections of the trade was better than continuing alone in narrow sectional interests.

The mica trade and industry could not be prosperous in this country unless it was prosperous in America, because Britain could not take all the mica which the various countries produced. Therefore, if Britain was going to be prosperous America must be prosperous in taking that portion of the output which Britain could not.

Personal Notes

DR. WALTER SAVAGE LANDIS, vice-president of the American Cyanamid Company, has been awarded the Gold Medal of the American Institute of Chemists.

MR. J. R. BARKLA, sales manager of J. W. Towers & Co., Ltd., Widnes, completes 50 years' service with the firm on July 3. He has seen the number of employees grow from under twenty in 1893 to over 450 to-day.

DR. B. A. SOUTHGATE has been promoted acting director of Water Pollution Research in the D.S.I.R. in succession to DR. A. PARKER, who has become director of Fuel Research.

The London section of the Institution of the Rubber Industry has elected the following officers: MR. GEORGE MARTIN, B.Sc., A.I.C. (chairman), MR. M. M. HEYWOOD (vice-chairman), and MR. H. C. BAKER, M.Sc., A.I.C. (hon. secretary).

The Melchett Medal, the highest award in the gift of the Institute of Fuel, is being presented this year to DR. E. S. GRUMELL, C.B.E., in recognition of the outstanding work tending to the economical use of fuel which he has done over a long period. Dr. Grumell has for many years been head of the I.C.I. coal research laboratories, and is chairman of the Fuel Efficiency Committee of the Ministry of Fuel and Power.

Obituary

MR. JOHN MORISON, director of the United Yeast Co., Ltd., died at Little Aston, Birmingham, on June 18, aged 50.

New Control Orders

Distribution of Essential Oils

A SCHEME for regulating the importation and distribution of essential oils, submitted by the Advisory Committee, has been published by authority of the Ministry of Food. The objects of the scheme are broadly: (a) to ensure that no import licence is wasted; (b) to avoid forcing up prices through unnecessary competition and to ensure fair distribution of orders among Empire producers and shippers; (c) to ensure equitable distribution among the various trades concerned, and among users in those trades; (d) to avoid passing the oils through an unnecessary number of hands; (e) to standardise margins of profit; and (f) to ensure that obligations attaching to oils imported through Lend-Lease channels are observed. The scheme, which comes into force on July 1 and is applicable only to essential oils imported into Great Britain and Northern Ireland, will be administered by a central body, known as Allocations Control, consisting of an independent firm of chartered accountants, Messrs. Whinney, Smith & Whinney, 4b Frederick's Place, Old Jewry, London, E.C.2 (from whom copies of the scheme are obtainable), and an Advisory Committee appointed by the various trade interests concerned. The Ministry of Food will be represented at all meetings of Allocations Control.

Export of Chemicals, Silica Bricks, etc.

Under the Export of Goods (Control) (No. 6) Order, 1943 (S. R. & O. 1943, No. 842), which comes into force on July 5, 1943, control is extended to cover putty, silica bricks, and additional metal goods, machinery, rubber manufactures, optical glass, and chemicals.

Licences will, in future, be required to export the following to all destinations: putty, refractory blocks, bricks and tiles of silica; machinery rollers of which the outer surface is of copper or copper alloy; anethol; gold compounds; oxalic acid; phlorogluceinol; platinum compounds; sodium hydrosulphite (sodium hyposulphite); copper compounds; insecticides, fungicides, weed-killers, animal dips and disinfectants, containing arsenic compounds, chlorinated naphthalenes, copper compounds, cyanides, fluorides, metaldehyde, nicotine or its salts, petroleum oils, pyrethrum or its extracts, resinates, rosin (colophony), liquid rosin (tall oil), silico-fluorides, sulphides or sulphur; radium and mesothorium compounds; and silver compounds.

Also, optical glass and optical instruments as specified in the lists issued by the Board of Trade under the Safeguarding of Industries Act, 1921, as amended and extended, and parts of such instruments.

Application of Potash Fertilisers

The Minister of Agriculture has made the Potash Fertiliser (Rates of Application) Order, 1943 (S. R. and O. 1943, No. 824), controlling the use of kainit, extra kainit, sylvinite, potash manure salt, muriate of potash, sulphate of potash, sulphate of potash-magnesia and any compound containing any of these substances. It specifies the rate at which potassium salts can be applied to particular crops. It does not prohibit or restrict, however, the application of these salts when they are used under special authority of a County War Agricultural Executive Committee, and the Order adds that the farmer is permitted to use potassium salts at rates in excess of those specified on part of a specified crop, provided that the total quantity applied to the whole of that crop does not exceed the limit laid down in the Order. The Imported Potash Fertiliser (Rates of Application) Order, 1942 (S.R. and O, 1942, No. 1207) is revoked on July 1, when the new order comes into force.

Prices of British Chemical Products

STEADY to firm price conditions generally rule in the London market for heavy chemical products this week and a fair volume of fresh inquiry is reported from most sections. Deliveries against contract commitments continue satisfactorily. In the soda products section a sustained demand is reported for caustic soda and acetate of soda, while a steady trade is taking place in hyposulphite of soda and nitrate of soda. Supplies of chlorate of soda are reported to be very scarce. There is a keen inquiry for the limited supplies of yellow prussiate of potash and permanganate of potash, while acid phosphate of potash is a good market. Quiet conditions are reported in the coal-tar products market as regards new business, although deliveries against contracts are well up to schedule. Solvent and heavy naphtha remain steady.

MANCHESTER.—Trade in heavy chemical products on the Manchester market during the past week has been brisker, after the holiday dullness, both in respect of new inquiries and the call for contract deliveries, and the latter have been resumed on a satisfactory scale. A steady demand for most descriptions of soda chemicals, as well as the magnesia and ammonia compounds and the acids, including sulphuric and hydrochloric, is maintained. With regard to the tar products there has been little change in the general position: the leading heavy classes, as well as the light materials, are being taken up in good quantities and values are maintained throughout.

GLASGOW.—In the Scottish heavy chemical trade the slight improvement reported last week has been maintained during the past week for home business. Export trade is still rather restricted. Prices remain very firm with no actual changes to report.

Price Changes

Rises: Alum; glycerine; lead, white, ground in oil; pitch; potassium nitrate; rosin; sodium hyposulphite, pea crystals; sodium phosphate; sodium prussiate; sodium sulphide.

Falls: Cream of tartar; tartaric acid.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./ 1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £16 per ton, f.o.r.

Aluminium Sulphate.—£11 10s. to £11 15s. per ton d/d.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Carbonate.—£38 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. See also Salammoniac.

Antimony Oxide.—£111 to £117 per ton.

Arsenic.—For 1-ton lots, £42 to £45 per ton, according to quality, ex store. Intermediate prices for intervening quantities.

Barium Carbonate.—MANCHESTER: precip. (4-ton lots), £16 per ton d/d.

Barium Chloride.—98/100%, prime white crystals, £17 10s. to £19 10s. per ton, bag packing, ex works.

Bleaching Powder.—Spot, 35/37%, £11 to £11 10s. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £31 10s.; crystals, £32 10s.; powdered, £33; extra fine powder, £34; B.P. crystals £40 10s.; powdered, £41; extra fine, £42 per ton for ton-lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £83; powder, £84 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £52 15s.; crystals, £53 15s.; powdered, £54 15s.; extra fine powder, £56 15s.; B.P. crystals, £61 15s.; powdered, £62 15s.; extra fine powdered, £64 15s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton, ex store.

Charcoal, Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£23 per ton, d/d in 16/17 cwt. drums (3-drum lots).

Chrometan.—Crystals, 5½d. per lb.

Chromic Acid.—1s. 5d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Copper Oxide.—Black, £95 per ton.

Copper Sulphate.—£31 5s. per ton, f.o.b., less 2 per cent. in 2 cwt. bags.

Cream of Tartar.—100%, £14 7s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£24 10s. to £26 per ton in casks, according to quantity, d/d. MANCHESTER: 40%, £24 10s. to £26 10s. per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £4 to £5 per cwt., according to quantity; in drums, £3 19s. 6d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 5½d. to 8s. 11d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Lactic Acid.—Pale tech., £49 per ton; dark tech., 43½% by weight, £42 per ton ex works; barrels returnable carriage paid.

Lead Acetate.—White, 50s. 6d. to 52s. 6d. per cwt. MANCHESTER: £51 to £54 per ton.

Lead Nitrate.—About £47 per ton d/d in casks.

Lead, Red.—English, 5/10 cwt., £44 10s. per ton; 10 cwt. to 1 ton, £44 5s.; 1/2 tons, £44; 2/5 tons, £43 10s.; 5/20 tons, £43; 20/100 tons, £42 10s.; over 100 tons, £42 per ton, less 2½%, carriage paid, non-setting red lead, 10s. per ton dearer in each case.

Lead, White.—Dry English, less than 5 tons, £57; 5/15 tons, £53; 15/25 tons, £52 10s.; 25/50 tons, £52; 50/200 tons, £51 10s. per ton; less 5%, carriage paid. Ground in oil, English, 1/5 cwt., £69; 5/10 cwt., £68; 10 cwt. to 1 ton, £67 10s.; 1/2 tons, £66; 2/5 tons, £65; 5/10 tons., £63; 10/15 tons, £62; 15/25 tons, £61; 50/100 tons, £60 10s. per ton, less 5% carriage paid.

Litharge.—1 to 2 tons, £44 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £18 15s. to £22 15s. per ton.

Magnesium Chloride.—Solid (ex wharf), £16 to £18 per ton. MANCHESTER: £14 to £16 per ton.

Magnesium Sulphate.—Commercial, £12 to £14 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 15s. 8d.; bichloride lump, 16s. 3d.; mercury oxide, red cryst., 20s. 9d.; red levig., 20s. 3d.; red tech., 19s. 11d.; yellow levig., 20s. 2d.; yellow tech., 19s. 7d.; sulphide, red, 17s. 9d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 4d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£60 to £65 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £53 7s. 6d. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement. Liquid, d/d, £34 in lots of 1 ton.

Potassium Bichromate.—Crystals and granular, 7⅞d. per lb.; ground, 8⅛d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £55 5s. per ton.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 10d. per lb. for 1 cwt. lots; for 3 cwt. and upwards, 1s. 9½d. per lb.; technical, £7 18s. 6d. to £8 10s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, 5 cwt. to 7 cwt., casks, 1s. 6d. per lb., d/d; supplies scarce.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic. — Solid 76/77%; spot, £16 7s. 6d. per ton d/d station.

Sodium Acetate.—£41 per ton, ex wharf.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 6¼d. per lb.; anhydrous, 6½d. per lb., net, d/d U.K.

Sodium Bisulphite Powder.—60/62%, £19 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £45 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £21 10s. per ton for 2-ton lots; commercial, £15 per ton.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 11d. per lb., for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£16 per ton, d/d U.K. in 1-ton lots.

Sodium Nitrite.—£20 to £23 10s. per ton for ton lots.

Sodium Percarbonate.—21½% available oxygen, £7 per cwt.

Sodium Phosphate.—Di-sodium, £25 to £28 10s. per ton d/d for ton lots. Tri-sodium, £26 to £30 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Sulphate (Glauber Salts).—£4 10s. ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 11s. per ton d/d station in bulk. MANCHESTER: £4 15s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot, £18 5s. per ton, d/d, in drums; crystals, 30/32%, £12 7s. 6d. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton, for quantities of not less than 4 tons; ground, but not sieved, £15 10s.; ground and sieved, £17 15s. Controlled prices.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—3s. 4½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards.

Tin Oxide.—Snow white, 305s.-315s. per cwt.

Zinc Oxide.—Maximum prices per ton for 2-ton lots, d/d; white seal, £34; green seal, £33; red seal, £31 10s.

Zinc Sulphate.—Tech., £20-£21 per ton, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 1s. 2d. to 2s. 1½d. per lb. Crimson, 2s. 2d. to 2s. 6d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Bisulphide.—£34 per ton, according to quality, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 6 3/16d. to 10½d. per lb.; dark, 6 3/16d. to 6 15/16d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermilion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.
Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B, See Concentrated Fertilisers.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, August, £9 10s.; increased charge of 1s. 6d. per month up to March, 1943.

Calcium Cyanamide.—Nominal; supplies very scanty.

Concentrated Fertilisers.—Per ton in 6-ton lots d/d farmer's nearest station, in August: I.C.I. Type, "Special III," £14 9s. 6d.; Type "B," £14 1s. 3d.; Type "C," £17 19s. Increased charge of 1s. 6d. per month up to March, 1943.

"Nitro Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean super-refined for 6-ton lots d/d nearest station, £15 5s. per ton; granulated, over 98%, £14 10s. per ton. Surcharges for smaller quantities unless collected at warehouse or depots.

Coal Tar Products

Benzol.—Crude, 60's, 1s. 11d.; pure, 2s. 6d., per gal., ex works.

Carbolic Acid.—Crystals, 9½d. to 11½d. per lb. Crude, 60's, 4s. 3d. to 4s. 6d., according to specification. MANCHESTER: Crystals, 9½d. to 11½d. per lb., d/d; crude, 4s. to 4s. 6d., naked, at works.

Creosote.—Home trade, 6½d. per gal., f.o.r., maker's works; exports, 6d. to 6½d. per gal., according to grade. MANCHESTER: 6½d. to 9d. per gal.

Cresylic Acid.—Pale, 97%, 3s. 6d. per gal.; 99%, 4s. 2d.; 99.5/100%, 4s. 4d. MANCHESTER: Pale, 99/100%, 4s. 6d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 8d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 2d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, in 4-ton lots, in sellers' bags, £5 9s. to £8 9s. per ton, according to m.p.; hot-pressed, £10 5s. per ton, in bulk ex works; purified crystals, £19 to £35 per ton. Controlled prices.

Pitch.—Medium, soft, 46s. to 55s. per ton, f.o.b. MANCHESTER: 46s. per ton, at works.

Pyridine.—90/140°, 18s. to 18s. 6d. per gal.; 90/160°, 14s. MANCHESTER: 14s. to 18s. 6d. per gal.

Toluol.—Pure, 2s. 5d. nominal; 90's, 1s. 10d. per gal. MANCHESTER: Pure, 2s. 5d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 1½d. to 3s. 4d. per gal., according to grade, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £24 to £25 per ton.

Methyl Acetone.—40/50%, £56 per ton.

Wood Creosote.—Unrefined, about 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. per gal.

Wood Tar.—£5 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10 cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—June 23.—For the period ending June 26, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies: LINSEED OIL, crude, £50. RAPESEED OIL, crude, £58. COTTONSEED OIL, crude, £39 12s. 6d; washed, £42 15s.; refined edible, £57; refined, deodorised, £58. COCONUT OIL, crude, £36 12s. 6d; refined deodorised, £49. PALM KERNEL OIL, crude, £36; refined deodorised, £49; refined hardened deodorised, £53. PALM OIL, refined deodorised, £55; refined hardened deodorised, £58. GROUNDNUT OIL, crude, £44; refined deodorised, £58. WHALE OIL, crude hardened, 42 deg., £39; refined hardened, 42 deg., £51. ACID OILS—Groundnut, £27 10s.; soya, £25 10s.; coconut and palm-kernel, £31. ROSIN, 28s. 6d. to 43s. per cwt., ex store, according to grade. TURPENTINE, American, 87s. per cwt. in drums or barrels, as imported (controlled price).

General News

From Week to Week

The staff of J. W. Towers and Co., Ltd., Widnes, started with a Wings for Victory target of £800, and achieved a total of £2056.

Newell (Chemicals), Ltd., are among the new members elected to the South of Scotland Chamber of Commerce, from the Hawick district.

New mills for limestone grinding are being installed in large numbers, chiefly at sites where chippings and waste limestone from roadstone plants can be converted into powder suitable for agriculture.

Warning of the possible danger of carbon monoxide poisoning has been sent to every operator of public service vehicles driven by producer gas. The manual of instructions issued with each new producer-gas unit also stresses the danger.

Ferguson, Shaw and Sons, the prominent Scottish oil and grease refiners and soap manufacturers, of Port Dundas and Paisley, have just attained their centenary. Messages of goodwill have been received on the occasion from trade friends throughout Scotland.

The Board of Trade states that a limited number of reconditioned battledress uniforms dyed green are now available for the use of workers engaged in acid pickling, plating, and dipping. They will be distributed through the employers, and will cost 21s. and 6 coupons each.

Metal milk-bottle caps must be made of zinc foil after June 30, according to a Ministry of Supply statement. Earlier in the war the demand for aluminium by the aircraft industry caused the dairy industry to develop a 92/8 tin-zinc alloy for the purpose. With the loss of Malaya, the need for tin economy led to the release of aluminium for dairy use, but the need to conserve that metal has now led to its substitution by zinc.

Foreign News

An Anglo-American survey of West Africa for new sources of tungsten and molybdenum is reported to be under way. Not only Nigeria, but also the Cameroons, Liberia, and Angola will be explored.

The severe damage inflicted by the R.A.F. this week on the J. P. Bemberg chemical works at Barmen (Wuppertal) recalls a name familiar to textile chemists. "Bemberg Yarn," a proprietary cuprammonium silk made by forcing through orifices a cuprammonium solution of cellulose made from cotton linters, and processing it afterwards with sulphuric acid, is one of the oldest established forms of artificial silk.

Handling of scrap iron and steel in British India is now under Government control.

A plastic respirator, to give protection against industrial dusts, has been approved by the U.S. Bureau of Mines.

Petrol must be mixed with fuel alcohol under the Fuel Alcohol Order, 1943, of the Government of India.

Japanese chemists have produced a leather substitute from silk, which the Government is encouraging industrialists to use, according to reports from Australia.

"Inside Fascist Spain," the latest *March of Time* film, shows the Rio Tinto mines being worked by Republican prisoners under the supervision of armed guards.

A new German company, the Lias Oelschiefer Forschungs G.m.b.H., has been formed at Balingen with a capital of 250,000 RM to erect a trial plant and investigate the possibilities of utilising oil shale.

Kalunite, Inc., plans an expenditure of over $1,000,000 for enlargement of its aluminium reduction plant at Salt Lake City, Utah. The project will be financed by the Defence Plant Corporation.

A paint material now used in Germany to protect iron and steel is said to contain the barium salt of nitrophthalic acid. A finely ground alloy of 87 per cent. aluminium and 13 per cent. silicon is reported to be in use for priming coats.

Exploration is being carried out by the U.S. Bureau of Mines to locate tin and other strategic metals in Alaska; the search is mainly centred in the tailings from placer gold mining operations, which, it is believed, might be treated for the tin content.

Chemical process industries in America will probably get no new graduates in chemical engineering between now and the end of the war, according to *Chem. Met. Eng.*, which comments that Washington's military minds have not yet learned to appreciate the engineer.

The value of imports of British chemicals into Turkey in 1942, through the United Kingdom Commercial Corporation, was £76,000, including medical supplies. In addition, despite war-time restrictions on exports, large quantities were exported direct by British firms.

Demand for fibre-glass textiles and similar materials has led to U.S. Government contract with Owens-Corning Fiberglas Corporation, Ohio, for the erection of a $1,600,000 fibre glass plant in Pennsylvania. The Defence Plant Corporation will finance the project, and will retain the title to the property.

Construction of a second plant for the manufacture of acrylonitrile has been announced by Röhm & Haas Co., Philadelphia. Most of the equipment in the new unit is being erected out-of-doors, following the principles of construction generally used in the petroleum industry.

The U.S. Bureau of Mines has selected Albany, Oregon, as the site for its new Northwest electro-development laboratory for the study of the recovery and processing of minerals in that area. The bureau is taking over the premises formerly occupied by the Lewis and Clark College.

"Jutelite," a plastic made from jute waste, is described by B.C. Guha and B.B Das, of Calcutta University, in *Science and Culture* (1943, 8, 9, p. 389). A chocolate-brown thermosetting powder, it can be moulded at 150° C. at a pressure of 3000 lb./sq. in. in three minutes.

Canadian production of industrial alcohol from wheat started in November, 1942, says a report of the Moose Jaw Board of Trade, and it is expected that before the close of the crop year on July 31, 1943, close to 4.5 million bushels of wheat will have been utilised for this purpose.

South African Alkali, Ltd.'s report of operations for the quarter ended March 31, shows that 3,148,400 gallons of brine were pumped and 1,338,000 gallons refrigerated. Soda ash produced totalled 505 tons, while salt production was 75 tons higher at 780 tons. Soda ash sold was 514 tons and salt sold 712 tons.

Factory premises to house the activities of Chrome Chemicals (Australia) Pty., Ltd., are rapidly nearing completion in New South Wales, and plant installation has commenced. Activities of this company embrace the manufacture of all chromium products, such as bichromate of soda, chromium sulphate, etc. The factory is expected to be in production shortly.

The Australian firm, King Island Scheelite, made a net profit of £51,036 for the year ended October 31, 1942, as against £6374 in 1940-41, and £22,124 for 1939-40. The company has decided to construct a new concentrating mill to treat 20,000 tons of crude scheelite a month, in view of the fact that a deposit of 1,100,000 tons of payable ore has been proved.

As a further measure to conserve high grade chromium ores, American producers of ferrochrome have been instructed to use a specific proportion of low grade ores in a direction issued by the War Production Board. This move requires each producer of ferrochrome to use, in the production of high carbon ferrochrome, chrome ores having a weighted chromium-to-iron ratio not exceeding 2.6 to 1.

Metallic sludges and residues from chemical processes are salvaged by the du Pont plants at the rate of over 10,000,000 lb. a month. Scrap nylon is salvaged by "unravelling" it until the two original raw materials, adipic acid and hexamethylenediamine, are obtained.

The recently-appointed foreign Minister of Finland, Henrik Ramsay, is a chemist who has published papers on guanido acids, and for several years worked as a chemist in sugar factories. His nephew, an American citizen, occupies a responsible position in American chemical industry.

Canada can produce unlimited quantities of magnesium at less than 15 c. per lb., according to officials investigating a new process of extracting the metal from asbestos waste rock. The process has been developed by a Montreal chemist, Mr. M. W. G. Wildman.

More rosin can now be produced in Spain, according to a report of Resinera Española, Bilbao, owing to a substantial extension of industrial plant. Production in 1942 amounted to 14,000 tons of crude rosin, 3000 tons of turpentine oil, and 10,000 tons of processed rosin oil. Most of the output is used locally.

New red lakes have been obtained by two Indian chemists, P. Neogi and K. L. Mondal, who find that two gallium compounds they have prepared can be used for dyeing fabrics. These are gallium alizarate and gallium-calcium alizarate; the former is said to resemble the scarlet aluminium compound, and the other is dull red in colour. (*J. Indian Chem. Soc.*, 1942, *19*, 12, p. 501).

The National Association of Waste Materials, Inc., in the U.S.A. has been instructed to segregate for reclamation bismuth alloys and residues, because a definite shortage is indicated in the supply of bismuth. Bismuth alloys of various compositions serve an important purpose in reducing time and labour in the preparation of patterns, dyes, and fixtures required in the aircraft industry.

A famine in technical books is reported in South Africa. The Government regulation restricting a library to one 4-lb. packet of books per week is hardly conducive to keeping South Africa up to date in the technical field, it is stated. Restriction on the import of books from the U.S.A. has now been imposed over and above the existing ban on shipments from Britain.

Etablissements Kuhlmann, the French chemical and dyestuffs trust, reports for 1942 a decline in gross income to 60.91 (97.25) mill. fr. to which must be added 16.17 (40.47) mill. fr. financial income. The financial interest in the German-controlled Francolor company to which the Kuhlmann dyestuffs factories have been transferred is shown at 488 mill. fr. in the accounts.

Forthcoming Events

A meeting of the Midland section of the **Institution of the Rubber Industry** will be held on **June 28,** at 7 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham, when Dr. G. Gee will speak on "The Absorption of Oil by Rubber."

The Leverhulme Memorial Lecture will be delivered before the Liverpool section of the **Society of Chemical Industry,** on **June 29,** at 6 p.m., in the Arts Lecture Theatre of Liverpool University. The subject is "Lord Leverhulme" and the lecturer, Mr. Horatio Ballantyne.

A whole-day conference of the Food Group of the **Society of Chemical Industry** jointly with the **Nutrition Society** will be held at the London School of Hygiene, Keppel Street, W.C.1, on **July 3,** starting at 11 a.m., with Professor H. D. Kay in the chair. The subject under discussion will be "Milk."

The annual general meeting of the **Society of Chemical Industry** takes place at the Royal Institution on **July 9,** at 2.30 p.m. The business portion of the meeting will be followed, at 4.45 p.m., by the presentation of the Society's Medal to Dr. L. H. Lampitt, and the Medallist's address.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Company Winding-up Voluntarily

PURE METAL MANUFACTURING CO., LTD. (C.W.U.V., 26/6/43.) By special resolution, June 3. Harold James Penn appointed liquidator.

Satisfaction

PURE PRODUCTS, LTD., New Basford, soap and candle manufacturers. (M.S., 26/6/43.) Satisfaction June 7 of mortgages registered June 5, 1926, and December 9, 1937.

Company News

Lodge, Robin and Hersom, Ltd., distillers of drugs, chemicals, essential oils, etc., 120 Moorgate, E.C.2, have changed their name to Lodge, Robin, Ltd.

S. Brannan & Sons, Ltd., chemical thermometer manufacturers, have increased their nominal capital by the addition of £4000 beyond the registered capital of £1000.

Egyptian Chemical & Drug Industries, Ltd., have increased their nominal capital by the addition of £10,000 in £1 ordinary shares, beyond the registered capital of £15,000.

Dividend distributions for 1942 of the two companies holding the capital of the operating company, **Reckitt and Colman, Ltd.,** are the same as in 1941: **Reckitt and Sons,** 22½ per cent.; **J. and J. Colman,** 16 per cent.

New Companies Registered

Anglo-Varnishes, Ltd. (380,970).—Private company. Capital: £100 in 100 shares of £1 each. Varnish, paint and putty manufacturers, manufacturing chemists, etc. Directors: N. Mottershead; W. Settle. Registered office: Wood Lane, Partington, Ches.

Owen W. Marks, Ltd. (381,108).—Capital: £3000 in 3000 shares of £1 each. Manufacturers of and dealers in chemicals, drugs, fertilisers, colours, glues, dyes, etc. Directors: O. W. Marks; Mrs. G. G. J. Marks, both of 148 Wilmslow Road Manchester, 20.

Oilcar, Ltd. (380,908).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in synthetic rubber and rubber substitutes, resins, plastics, chemical products, paints and varnishes, research workers, etc. Subscribers: J. Cookson and Edith Sanders. Registered office: 26 Grosvenor Gardens, S.W.1.

Antiseptics and Pharmaceuticals, Ltd. (381,114).—Private company. Capital: £500 in 500 shares of £1 each. Chemical manufacturers, exporters, importers, merchants, brokers, factors, etc. Directors: G. A. Humble; R. A. Y. Suddaby; Dr. J. A. Adams; Frank C. Jeffree, 35 Albemarle Street, W.1. (permanent managing director).

Samuel Bros. (Plastics), Ltd. (380,717).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers of and dealers in plastic goods and materials, general engineers, insulators, manufacturing and research chemists, etc. Directors: M. Samuel; J. Samuel. Registered office: 50 Ellesmere Street, Manchester, 15.

Patches, Ltd. (371,165).—Private company. Capital: £1000 in 1000 shares of £1 each. Merchants, manufacturers, agents, etc., dealing with vegetable, mineral and chemical substances, detergents, paints, varnishes, enamels, polishes, etc. Directors: D. Dewey; L. C. Smithson. Registered office: 194 Corporation Street, Birmingham.

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NEW COMPANIES

Rolls Super Engineering Co., Ltd. (381,037).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of and dealers in fire extinguishers, hydrant installations, pumps, fireproof curtains, doors and flooring and fireproof material generally, etc. Directors: F. J. Hansell; R. Campbell. Registered office: 120 Alfred Gelder Street, Hull.

Ratbane, Ltd. (380,714).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturers of and dealers in chemicals capable of being used for the destruction of vermin and pests, manufacturers of and dealers in chemicals, disinfectants, fertilisers, etc. Directors: R. B. Constant; C. S. Kregor. Registered office: Regent House, Fitzroy Square, W.1.

Gala Works, Ltd. (380,805).—Private company. Capital: £2000 in 2000 shares of £1 each. Merchants and brokers of metals, ores, residues, chemicals, fertilisers, ferro-alloys and plastic substances, scrap iron merchants, etc. Directors: L. Lazarus; F. M. Garnham; G. B. Garnham; A. A. Lazarus. Registered office: 100 Brighton Road, Purley, Surrey.

Agraphite Ltd. (381,154).—Private company. Capital: £2000 in 1750 preferred shares of £1 each and 5000 deferred ordinary shares of 1s. each. Manufacturers of and dealers in paint, graphite preservatives, jointing compounds, lubricating graphite, plumbago and other graphite products, etc. First directors: A. C. Hunter; M. E. Onion; C. W. Hunter. Solicitors: Ashby, Rogers and Fournier, 12 Henrietta Street, W.C.2.

Chemical and Allied Stocks and Shares

SHARES of chemical and kindred companies have reflected the quiet conditions which have again obtained in the stock and share markets. There has been very little selling, but in some directions prices have been inclined to ease owing to the small demand in evidence.

Imperial Chemical maintained the improvement to 39s. 3d. shown a week ago, but Lever & Unilever were easier at 33s. 3d. and Lever N.V. 32s. 3d. Goodlass Wall 10s. shares, which remained under the influence of the results and higher distribution, were again around 14s. 6d., but Dunlop Rubber moved back 6d. to 35s. 6d. and Barry & Staines reacted to 40s. awaiting the dividend announcement. In accordance with the general tendency, British Aluminium at 48s. 6d. were easier, and British Oxygen 73s.

Numerous shares remained firmly held on the assumption that after the war there may be reasonable scope for a gradual return to the dividend rates ruling prior to 1939. Turner & Newall, for instance, were little changed on balance at 75s. 9d. at which there is only a small yield on last year's 12½ per cent. dividend, but in the immediate pre-war years dividends up to 20 per cent. ruled. Wall Paper Manufacturers deferred units were little changed at 36s. 9d. This is another instance where the current yield is very small, but where it is hoped there may be scope for recovery in dividend payments after the war. In fact, the general tendency is to take a long view, and moreover, the disposition is for the strength of the balance-sheet position of individual companies to have as important an influence on share values as the current rate of dividend.

British Plaster Board shares again tended to recover in price, pending the preliminary statement for the past financial year, and have changed hands around 28s. 3d. at the time of writing. Elsewhere, however, Associated Cement ordinary had an easier appearance at 57s. 6d. On the other hand, the units of the Distillers Co., after moving down to 85s., rallied to 85s. 6d., maintenance of the dividend being generally expected. Paint shares were firm and inclined to move higher under the lead of Lewis Berger, which improved to 84s. on the announcement regarding a subsidiary undertaking to deal with plastics, Berger Plastic Development. Shares of other companies connected with plastics remained fairly active, and at £6½ Thomas De La Rue maintained most of the rise which followed the dividend announcement. British Industrial Plastics 2s. shares were again 5s. 10½d., Erinoid 11s. 6d., while Lacrinoid Products were around 4s. 6d. Elsewhere, General Refractories have been steady at 15s. 7½d., while Imperial Smelting remained at 14s. and Borax Consolidated were again 34s. Awaiting the financial results, Amalgamated Metal shares were little changed on balance at 17s. 1½d. In other directions, Nairn & Greenwich were steady at 66s. 3d. pending declaration of the interim dividend. Various iron, steel and kindred shares eased a few pence. Guest Keen were 33s., Dorman Long 27s. 6d., United Steel 26s. 1½d., Stewart & Lloyds 50s., Babcock & Wilcox 47s. 9d., and Tube Investments 91s. 3d. Elsewhere, British Glues & Chemicals 4s. shares were firm at 8s. 1½d., pending the financial results.

Greeff-Chemicals Holdings 5s. ordinary were 7s. 3d., and at one time Lawes Chemical 10s. shares changed hands at 11s. 3d. Burt Boulton were 18s. 9d. and P. Laporte remained firm at 78s. William Blythe 3s. shares changed hands at 8s. 6d. and Monsanto Chemicals 5½ per cent. preference were again 22s. 6d. Triplex Glass showed a better tendency at 31s. 4½d., while Forster's Glass were firm at 28s. on the dividend, and elsewhere, British Indestructo Glass held their recent improvement to 4s. 6d. At 40s. 9d. Boots Drug showed little change on balance, while Sangers were 20s. 4½d. and Timothy Whites 28s. 1½d. Among textile issues, British Celanese, Courtaulds and Calico Printers were better, while Bradford Dyers had an easier appearance. Among oil shares, Trinidad Leaseholds remained firmer under the influence of the results, while Anglo-Iranian were again better, the latter continuing to be influenced by the new agreement with the Persian Government.

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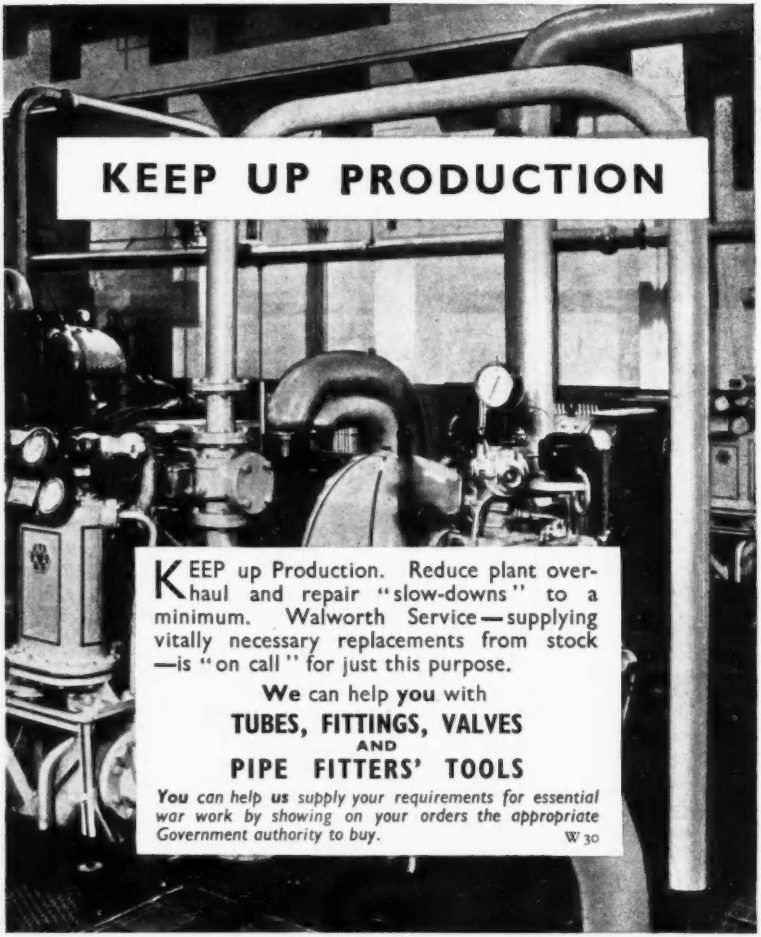

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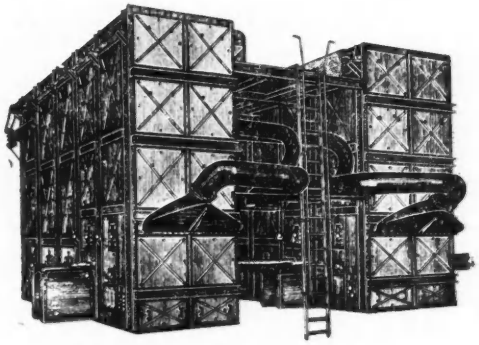

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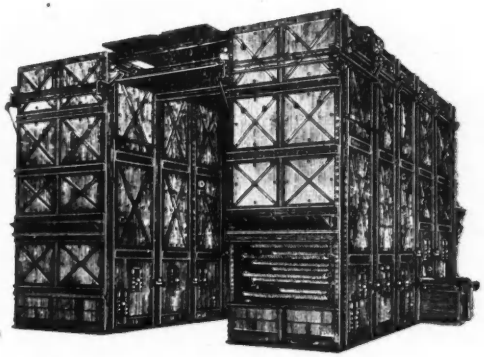

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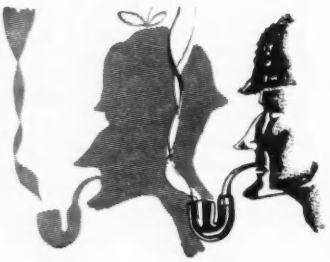

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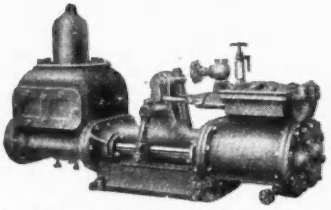

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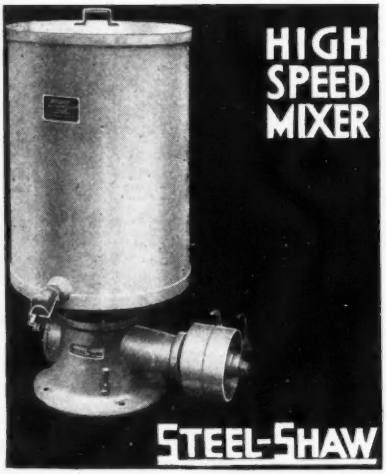

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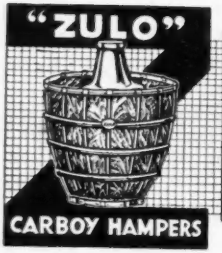

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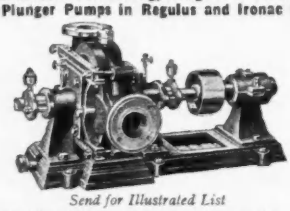

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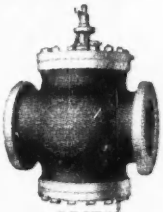

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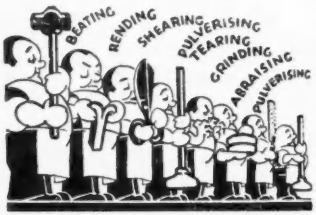

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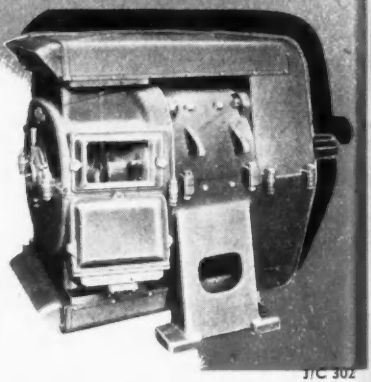

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